The Graduate College
Rush University

Master of Science in
BIOTECHNOLOGY

Program Manual

FALL 2018

Program Director:
Gabriella Cs-Szabo, PhD

All course and performance requirements and Policies and Procedures listed here may be imposed on Biotechnology Program Students in addition to those which apply to all Graduate College Students and which are described in detail in the Rush University Bulletin under the heading of The Graduate College.

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Program Terminal Objectives

Master of Science in Biotechnology

Program objective: to employ science-based biomedical technology training to develop research professionals who are capable of directly entering a position in a biomedical research laboratory or continue their education in professional medical/biomedical programs.

Goal 1: Build strong knowledge in basic biomedical sciences

Student Learning Outcomes: By the end of the program, students will be able to

1. describe and discuss the molecular basis for life in living organisms. *(GCC 501-504*)
2. describe and discuss physiological and pharmacological mechanisms involved in drug action. *(GCC 510)*

Goal 2: Build competence in essential laboratory methods in biotechnology

Student Learning Outcomes: By the end of the program, students will be able to

1. develop the technical skills needed to independently perform and analyze experiments. *(BTN 531-537)*
2. develop skills in laboratory communication and management by maintaining the regulations of Good Laboratory Practices. *(BTN, 524, 526, 531-537and GLP training)*

Goal 3: Develop basic research skills

Student Learning Outcomes: By the end of the program, students will be able to

1. develop research strategies and apply the theoretical knowledge learned in classes and the methods learned in the laboratory to the solution of research problems in an ethical way. *(GCC 501-504, GCC 510; BTN 531-537, BTN 525, GCC 506-507)*
2. communicate scientific discoveries and to understand and use scientific literature as a basis for hypothesis driven research. *(BTN 524-525, BTN 537)*

Policies and Procedures

Master of Science in Biotechnology

Please refer to additional Policies and Procedures in the Rush University Catalog

1. Program Accreditation

Rush University is approved to offer the Master of Science degree in Biotechnology by the State of Illinois Board of Higher Education. This program is also included in the usual accreditation process for Rush University by the Higher Learning Commission of Colleges and Schools.

2. Program Description

The Biotechnology Program aims to teach graduate-level basic science and to train students in biomedical research technology. The requirements for the Master of Science degree will be met within a two-semester enrollment of 34 semester hours. Typically, all students follow the same curricular plan, beginning in the Fall Semester. Students also participate in the University-level Interprofessional education non-credit course, IPE 502.

3. Student Performance Requirements

a. Class attendance

Although attendance in lecture courses is not required, it is strongly advised. These courses are graded by assignments and examinations. All laboratory courses, BTN 531-537, and other performance-based courses, such as GCC 506, GCC 507, GCC 524, 525 and 526 require on-time attendance. Grading is accomplished by evaluation of student participation and performance on a daily basis as well as by assignments, presentations, quizzes and written examinations. IPE will be graded as P/NP.

b. Grading

Letter grades of A, B, C and F can be earned in all courses. A letter grade of B, or better, must be maintained for the average of all graded coursework.

Core Courses (GCC 501-504 and GCC 510) will be graded by examination of knowledge and application of the knowledge gained throughout of these courses. Laboratory theory and practice courses, such as BTN 531-537 and BTN 524-26, will be graded as the learning and acquisition of skills are evaluated on a daily basis during each class session. Students will continue to demonstrate their ability to instructors until the performance is acceptable. In some cases, examination by

written tests and oral presentations may be included. A letter grade will be assigned for each of these courses, as well.

c. Consequences of Failure

A limited time is available to correct failures. Therefore, every effort must be made by the student to accomplish Passing and B-level performance. There is no make-up exam offered to correct for a C grade. A C-grade can be compensated by a letter grade of A in another course with the same credit value. A grade point average of 3.0 must be kept for good academic standing and graduation from the program.

Failure to attend or failure to perform in a laboratory course will require an individual arrangement to demonstrate acceptable performance to the instructor or course director.

Multiple failures may result in interruption of the student's program, according to the determination of the Biotechnology Program Director with the advice of the Dean and the Graduate College Council. Each case of impaired performance will be considered individually.

d. The Status of Good Academic Standing

An interview with the Program Director will take place each term. These meetings are given as a One-On-One meeting to discuss academic progress, concerns, and future plans.

All students who maintain a B letter grade average while completing the required course sequence with full-time enrollment will be considered to be *In Good Academic Standing* within the Graduate College and are eligible for graduation with the M.S. degree.

Any student who fails to maintain a B letter grade average will be considered to be *In Academic Difficulty* until the deficiency is corrected. Those requirements will be determined by the Biotechnology Program Director with the advice of the Dean and the Graduate College Council. A student In Academic Difficulty is not eligible for graduation.

e. Course Evaluation

All courses offer a student-based course evaluation which is voluntary, anonymous, yet very valuable for program development. At the end of the Spring Semester, you will also be invited to fill-in a graduation survey. Your comments will be kept in confidence. Your suggestions are taken seriously and used to shape future offerings of this program.

f. Graduation Requirements

Students planning to graduate should:

- Be registered in the term in which they plan to graduate

- Complete an "Intent to Graduate" form online
- Be in good academic standing
- Complete all course work
- Complete a "Degree Approval" form and return it to the Registrar's Office by the required date

g. Additional University Requirements

The Office of the Registrar manages required forms for graduation and these will be made available to you at the appropriate time before graduation. Please complete these forms within the required dates in order to insure availability of your diploma, cap and gownand other requirements of commencement celebration and graduation from the program and the University.

Requirements for separation from Rush University include the return of University identification badges, keys, lockers and laboratory equipment assigned to you at the beginning of the academic year.

Master of Science in Biotechnology

Curriculum 2018-19

Rush University Graduate College offers a 2-semester, non-thesis Master's Degree program designed to prepare the student for a research career in the pharmaceutical and biotechnology industries or in the university laboratory. This program is also an excellent preparation for additional graduate-level training toward the Ph.D., M.D., D.D.S., PharmD and other advanced degrees.

Course work (please refer to course titles and numbers listed in the table):

Biotechnology students take the Graduate College Core Curriculum series of courses covering biochemistry; molecular biology and genetics; cell biology; tissue biology; and pharmacology.

Additional courses are designed specifically to prepare the student for competency in research and a career in the laboratory: Research Ethics; Biomedical Statistics; Experimental Design and Models of Disease; Good Laboratory Practices; Communication; and Laboratory Management.

At the center of this program is the series of hands-on laboratory courses designed to cover the most important techniques and methods employed in biomedical research today. These laboratory experiences ensure proficiency in a wide variety of techniques, making the student highly competitive for employment in this ever-expanding and understaffed job market.

The program culminates in a capstone research experience, where students use their combined theoretical and practical knowledge to complete a small research project.

Students also participate in the University-level Interprofessional Education course to learn about how their knowledge and practice fits into the team-based health research and patient-centered healthcare.

Course work:

Fall Semester		SH
BTN 525	Experimental Design and Models of Disease	2
BTN 531	Laboratory Techniques I (introduction to laboratory; good laboratory practices, cell culture, data management)	2
BTN 532	Laboratory Techniques II (chromatography; electrophoresis; densitometry/imaging; ELISA)	2
BTN 533	Laboratory Techniques III (genomics; cloning, transformation; Transfection; PCR	2
GCC 501	Molecular Biology and Human Genetics	3
GCC 502	Cellular Biochemistry: Proteins and Metabolism	3
GCC 503	Functional Cell Biology	1
		15
Spring Semester		
*BTN 524	Communications	1
*BTN 526	Laboratory Management	1
BTN 534	Laboratory Techniques IV (study design; animal handling; surgical techniques)	2
BTN 535	Laboratory Techniques V (HPLC; flow cytometry)	1
BTN 536	Laboratory Techniques VI (histology and immunohistochemistry; microscopy)	2
BTN 537	Research Capstone (Lab)	4
GCC 504	Functional Tissue Biology	3
GCC 506	Research Ethics	1
GCC 507	Biomedical Statistics	2
GCC 510	Introduction to Pharmacology	3
		19

Semester Hours Required for MS Degree: 34

*Either BTN 524 or BTN 526 must be selected

IPE 502 throughout the Fall and Spring semesters no credit

BIOTECHNOLOGY
Faculty Roster

Program Director: **Gabriella Cs-Szabo, Ph.D.**
Associate Dean
438 AAC (Armour Academic Center)
942-2255
Gabriella_Cs-Szabo@rush.edu

Program Coordinator: **Tamiko Bailey, M.S.**
438 AAC
942-8331
Tamiko_Bailey@rush.edu

Laboratory Coordinators: **Lawrence Madsen**
Biotechnology, 718 AAC
563-2435
Lawrence_Madsen@rush.edu

John Gallagher
Biotechnology, 718 AAC
563-2435
John_J_Gallagher@rush.edu

Course Directors:

GCC 501 **Sanda Predescu, Ph.D.**
953 Jelke
563-2437
Sanda_Predescu@rush.edu

GCC 502 **Gabriella Cs-Szabo, Ph.D.**
438 AAC
942-2255
Gabriella_Cs-Szabo@rush.edu

GCC 503 **Jitesh Pratap, Ph.D.**
1409B Jelke
563-4633
Jitesh_Pratap@rush.edu

GCC 504 **Christopher Forsyth, Ph.D.**
258A Cohn
942-9009
Chistopher_Forsyth@rush.edu

GCC 506
GCC 510

Animesh Barua, Ph.D.
414 Cohn
942-6666
Animesh_Barua@rush.edu

GCC 507

Sanjib Basu, Ph.D.
470 TOB (Triangle Office Building)
563-2723
Sanjib_Basu@rush.edu

BTN 524

Jorge A. Girotti, M.A., Ph.D.
Jorge_Girotti@rush.edu

BTN 525

Paul Carvey, Ph.D.
Paul_Carvey@rush.edu

BTN 526
BTN 533

Dan Predescu, Ph.D.
1415 Jelke
563-2436
Dan_Predescu@rush.edu

BTN 531
BTN 532
BTN 535
BTN 537

Tom Schmid, Ph.D.
514 Cohn
942-23051
Tom_Schmid@rush.edu

BTN 534

Jeffrey Oswald, D.V.M.
Comparative Research
Center , 206 Cohn
942-6576
Jeffrey_P_Oswald@rush.edu

BTN 536

Amarjit Virdi, Ph.D.
1303 Jelke
942-5143
Amarjit_Virdi@rush.edu

Kristin Al-Ghoul, Ph.D.
512D AAC
563-2672
Kristin_J_Al-Ghoul@rush.edu

Graduate College Peer Mentors: (BTN Alumni)

Isadora Daphne Calma, PhD Student
Isadora_Calma@rush.edu

Natasha Ferguson, PhD Student
Natasha_Ferguson@rush.edu

Carl Gunnar Gottschalk, PhD Student
Carl_G_Gottschalk@rush.edu

Oscar Jimenez, PhD Student
Oscar_A_Jimenez@rush.edu

Catherine Yuh, PhD Student
Catherine_Yuh@rush.edu

IMPORTANT NAMES, NUMBERS AND LOCATIONS

Rush Graduate College: **Suite 438 AAC**
Andrew Bean, Ph.D., Dean
Andrew_J_Bean@rush.edu

Gabriella Cs-Szabo, Ph.D., Associate Dean
312-942-2255, Gabriella_Cs-Szabo@rush.edu

Marenda Wilson-Pham, Ph.D., Associate Dean
Marenda_Wilson-Pham@rush.edu

Tamiko Bailey, M.S.; Program Coordinator
312-942-8331, Tamiko_Bailey@rush.edu

Laurice Knox, M.P.H., College Manager
312-563-3391, Laurice_Knox@rush.edu

Marisol Vega, Admissions Specialist
312-942-7994, Marisol_Vega@rush.edu

Office of Student Affairs:

Vice Provost of Student Affairs: Gayle Ward, J.D.
312-942-2285, Gayle_Ward@rush.edu

4th floor AAC

Registrar: Brenda Weddington, M.Ed.
312- 942-5681, Brenda_Weddington@rush.edu

Bursar (Tuition): Patrick McNulty (1700 W. Van Buren St., Suite 282A)
312-942-6849, Patrick_J_McNulty@rush.edu

Financial Aid: Jill E. Gable, M.B.A.
312-942-1754, Jill_Gable@rush.edu

International Services: Nicole Meeuwse Tiénou
Nicole_meeuwsetienou@rush.edu
312-942-2030

9th Floor AAC

Student Life (Housing): Angela Branson
312-942-6302, Angela_Branson@rush.edu
www.rushu.rush.edu/studentlife/housing/index.html

Computer Center: METC
312-942-6799, METC_IDT@rush.edu

5th Floor AAC

Rush University Library Jo Cates, MLIS, Library Director
312-942-8735, Jo_Cates@rush.edu

Rush University Counseling Center
Kidston House
630 S. Hermitage Ave., Suite 701
Chicago, IL 60612
Hours: 9 a.m.–5 p.m., Monday–Friday
(312) 942-3687 (phones staffed 8:30 a.m.–5 p.m.)

Counseling staff
•Hilarie Terebessy, PhD, direct line: (312) 942-3013
•Kunal Sachdev, PsyD, direct line: (312) 942-3405
•Meghan Kean, PsyD, direct line: (312) 942-5726

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 1** **BIOTECHNOLOGY**

	Monday 9-03 LABOR DAY	**Tuesday** 9-04	**Wednesday** 9-05	**Thursday** 9-06	**Friday** 9-07
8:00 8:50	xxxxxxxxxxx	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC
9:00 9:50	xxxxxxxxxxx	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC
10:00 10:50	xxxxxxxxxxx	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC
11:00 11:50	xxxxxxxxxxx	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC ***Lab Book Check***
12:00 12:50	xxxxxxxxxxx				
1:00 1:50	xxxxxxxxxxx	GCC 501 1-4:00 540 AAC	BTN 525 1-3 135 TOB	GCC 501 1-4:00 540 AAC	**Library Training** **1 – 2:30** **AAC**
2:00 2:50	xxxxxxxxxxx	GCC 501 1-4:00 540 AAC	BTN 525 1-3 135 TOB	GCC 501 1-4:00 540 AAC	**Library Training** **1 – 2:30** **AAC**
3:00 3:50	xxxxxxxxxxx	GCC 501 1-4:00 540 AAC		GCC 501 1-4:00 540 AAC	
4:00 4:50	xxxxxxxxxxx				
5:00 5:50	xxxxxxxxxxx				

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 2** **BIOTECHNOLOGY**

	Monday 9-10	**Tuesday** 9-11	**Wednesday** 9-12	**Thursday** 9-13	**Friday** 9-14
8:00 8:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC Exam #1	
9:00 9:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC	
10:00 10:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC	BTN 525 10-12 976 AAC
11:00 11:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC	BTN 525 10-12 976 AAC
12:00 12:50					
1:00 1:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 Quiz #1 540 AAC	BTN 525 1-3 539 AAC	GCC 501 1-4:00 540 AAC	
2:00 2:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 540 AAC	BTN 525 1-3 539 AAC	GCC 501 1-4:00 540 AAC	
3:00 3:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 540 AAC		GCC 501 1-4:00 540 AAC	
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 3** **BIOTECHNOLOGY**

	Monday 9-17	**Tuesday** 9-18	**Wednesday** 9-19	**Thursday** 9-20	**Friday** 9-21
8:00 8:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	
9:00 9:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	
10:00 10:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	
11:00 11:50	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC	
12:00 12:50					
1:00 1:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 Quiz #2 540 AAC	BTN 525 1-3 539 AAC	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 ***Review*** 976 AAC
2:00 2:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 540 AAC	BTN 525 1-3 539 AAC	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 ***Review*** 976 AAC
3:00 3:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 540 AAC		GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 ***Review*** 976 AAC
4:00 4:50	BTN 525 4:00-5:30 976 AAC				
5:00 5:50	BTN 525 4:00-5:30 976 AAC				

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 4** **BIOTECHNOLOGY**

	Monday 9-24	**Tuesday** 9-25	**Wednesday** 9-26 GOLF OUTING	**Thursday** 9-27	**Friday** 9-28
8:00 8:50	BTN 531 8:30-10 722 AAC Quiz #2	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC Exam #2	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC
9:00 9:50	BTN 531 8:30-10 722 AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC
10:00 10:50		BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC
11:00 11:50		BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 994A AAC	BTN 531 8:30-12 722 AAC	BTN 531 8:30-12 722 AAC ***Lab Book Check***
12:00 12:50					
1:00 1:50	GCC 501 1-4:30 *** MIDTERM*** 540 AAC	GCC 501 1-4:00 540 AAC		GCC 501 1-4:00 540 AAC	
2:00 2:50	GCC 501 1-4:30 *** MIDTERM*** 540 AAC	GCC 501 1-4:00 540 AAC		GCC 501 1-4:00 540 AAC	
3:00 3:50	GCC 501 1-4:30 *** MIDTERM*** 540 AAC	GCC 501 1-4:00 540 AAC		GCC 501 1-4:00 540 AAC	
4:00 4:50	GCC 501 1-4:30 *** MIDTERM*** 540 AAC	BTN 525 4:00-5:30 976 AAC			
5:00 5:50		BTN 525 4:00-5:30 976 AAC			

RUSH GRADUATE COLLEGE FALL SEMESTER: 2018 WEEK: 5 BIOTECHNOLOGY

	Monday 10-01	**Tuesday** 10-02	**Wednesday** 10-03	**Thursday** 10-04	**Friday** 10-05
8:00 8:50					BTN 531 8:30-12 722 AAC
9:00 9:50		BTN 531 GLP 9-3 976 AAC	BTN 531 GLP 9-1 160 Cohn	BTN 531 9-11 ***** GLP EXAM***** 976 AAC	BTN 531 8:30-12 722 AAC
10:00 10:50		BTN 531 GLP 9-3 976 AAC	BTN 531 GLP 9-1 160 Cohn	BTN 531 9-11 ***** GLP EXAM***** 976 AAC	BTN 531 8:30-12 722 AAC
11:00 11:50		BTN 531 GLP 9-3 976 AAC	BTN 531 GLP 9-1 160 Cohn		BTN 531 8:30-12 722 AAC
12:00 12:50		BTN 531 GLP 9-3 976 AAC	BTN 531 GLP 9-1 160 Cohn		
1:00 1:50	GCC 501 1-4:00 540 AAC	BTN 531 GLP 9-3 976 AAC	BTN 525 1-3 976 AAC	GCC 501 1-4:00 Quiz #3 540 AAC	
2:00 2:50	GCC 501 1-4:00 540 AAC	BTN 531 GLP 9-3 976 AAC	BTN 525 1-3 976 AAC	GCC 501 1-4:00 540 AAC	
3:00 3:50	GCC 501 1-4:00 540 AAC	BTN 531 GLP 9-3 976 AAC		GCC 501 1-4:00 540 AAC	
4:00 5:00					
5:00 6:00					

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 6** **BIOTECHNOLOGY**

	Monday 10-08	**Tuesday** 10-09	**Wednesday** 10-10	**Thursday** 10-11	**Friday** 10-12
8:00 8:50			BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
9:00 9:50	BTN 525 ***Exam I*** 9-12 540 AAC	BTN 531 8:30-12 540 AAC Exam #3	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
10:00 10:50	BTN 525 ***Exam I*** 9-12 540 AAC	BTN 531 8:30-12 540 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
11:00 11:50	BTN 525 ***Exam I*** 9-12 540 AAC	BTN 531 8:30-12 540 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
12:00 12:50					
1:00 1:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 976 AAC	BTN 525 1-3 976 AAC	GCC 501 1-4:00 Quiz #4 540 AAC	
2:00 2:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 976 AAC	BTN 525 1-3 976 AAC	GCC 501 1-4:00 540 AAC	
3:00 3:50	GCC 501 1-4:00 540 AAC	GCC 501 1-4:00 976 AAC		GCC 501 1-4:00 540 AAC	
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 7** **BIOTECHNOLOGY**

	Monday 10-15	**Tuesday** 10-16	**Wednesday** 10-17	**Thursday** 10-18	**Friday** 10-19
8:00 8:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC Quiz #1	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 539 AAC Exam #1
9:00 9:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 539 AAC
10:00 10:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 539 AAC
11:00 11:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 539 AAC
12:00 12:50					
1:00 1:50	GCC 501 1-4:00 ***Review*** 540 AAC	GCC 501 1-4:30 *** FINAL EXAM*** 540 AAC		GCC 502 1-4:00 540 AAC	GCC 503 1-3:00 539 AAC
2:00 2:50	GCC 501 1-4:00 ***Review*** 540 AAC	GCC 501 1-4:30 *** FINAL EXAM*** 540 AAC		GCC 502 1-4:00 540 AAC	GCC 503 1-3:00 539 AAC
3:00 3:50	GCC 501 1-4:00 ***Review*** 540 AAC	GCC 501 1-4:30 *** FINAL EXAM*** 540 AAC		GCC 502 1-4:00 540 AAC	
4:00 4:50		GCC 501 1-4:30 *** FINAL EXAM*** 540 AAC			
5:00 5:50					

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 8** **BIOTECHNOLOGY**

	Monday 10-22	**Tuesday** 10-23	**Wednesday** 10-24	**Thursday** 10-25	**Friday** 10-26
8:00 8:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC		
9:00 9:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 9-12 722 AAC	
10:00 10:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 9-12 722 AAC	
11:00 11:50	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 9-12 722 AAC	
12:00 12:50					
1:00 1:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 503 1-3:00 539 AAC	GCC 503 1-3:00 539 AAC
2:00 2:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 503 1-3:00 539 AAC	GCC 503 1-3:00 539 AAC
3:00 3:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC			
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE FALL SEMESTER: 2018 WEEK: 9 BIOTECHNOLOGY

	Monday 10-29	**Tuesday** 10-30	**Wednesday** 10-31	**Thursday** 11-01	**Friday** 11-02
8:00 8:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC Exam #2
9:00 9:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC Exam #2
10:00 10:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC Exam #2
11:00 11:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC Exam #2
12:00 12:50					
1:00 1:50	GCC 502 1-4:00 Quiz #1 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 503 1-3:00 539 AAC	GCC 503 1-3:00 539 AAC
2:00 2:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 503 1-3:00 539 AAC	GCC 503 1-3:00 539 AAC
3:00 3:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC			
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE FALL SEMESTER: 2018 WEEK: 10 BIOTECHNOLOGY

	Monday 11-05	**Tuesday** 11-06	**Wednesday** 11-07	**Thursday** 11-08	**Friday** 11-09
8:00 8:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC Quiz #1	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
9:00 9:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
10:00 10:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
11:00 11:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
12:00 12:50					
1:00 1:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 503 1-3:00 Quiz #1 539 AAC	GCC 503 1-3:00 539 AAC
2:00 2:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 503 1-3:00 539 AAC	GCC 503 1-3:00 539 AAC
3:00 3:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC			
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE FALL SEMESTER: 2018 WEEK: 11 BIOTECHNOLOGY

	Monday 11-12	**Tuesday** 11-13	**Wednesday** 11-14	**Thursday** 11-15	**Friday** 11-16
8:00 8:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
9:00 9:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
10:00 10:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 722 AAC
11:00 11:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 9-12 722 AAC
12:00 12:50					
1:00 1:50	GCC 502 1-4:00 Quiz #2 540 AAC	GCC 502 ***Review*** 1-4:00 540 AAC		GCC 502 *****MIDTERM***** 1-4:30 540 AAC	GCC 503 1-3:00 539 AAC
2:00 2:50	GCC 502 1-4:00 540 AAC	GCC 502 ***Review*** 1-4:00 540 AAC		GCC 502 *****MIDTERM***** 1-4:30 540 AAC	GCC 503 1-3:00 539 AAC
3:00 3:50	GCC 502 1-4:00 540 AAC	GCC 502 ***Review*** 1-4:00 540 AAC		GCC 502 *****MIDTERM***** 1-4:30 540 AAC	
4:00 4:50				GCC 502 *****MIDTERM***** 1-4:30 540 AAC	
5:00 5:50					

RUSH GRADUATE COLLEGE FALL SEMESTER: 2018 WEEK: 12 BIOTECHNOLOGY

	Monday 11-19	**Tuesday** 11-20	**Wednesday** 11-21	**Thursday** 11-22	**Friday** 11-23
8:00 8:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC Quiz #2		THANKSGIVING RECESS	THANKSGIVING RECESS
9:00 9:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC			
10:00 10:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC			
11:00 11:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC			
12:00 12:50					
1:00 1:50	GCC 503 1-3:00 540 AAC	GCC 503 ***Review*** 1-3:00 540 AAC			
2:00 2:50	GCC 503 1-3:00 540 AAC	GCC 503 ***Review*** 1-3:00 540 AAC			
3:00 3:50					
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE FALL SEMESTER: 2018 WEEK: 13 BIOTECHNOLOGY

	Monday 11-26	**Tuesday** 11-27	**Wednesday** 11-28	**Thursday** 11-29	**Friday** 11-30
8:00 8:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 FINAL EXAM 710 – 713 AAC
9:00 9:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 FINAL EXAM 710 – 713 AAC
10:00 10:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 FINAL EXAM 710 – 713 AAC
11:00 11:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 532 8:30-12 FINAL EXAM 710 – 713 AAC
12:00 12:50					
1:00 1:50	GCC 503 ***Exam*** 1-4 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 502 1-4:00 540 AAC	
2:00 2:50	GCC 503 ***Exam*** 1-4 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-3 976 AAC	GCC 502 1-4:00 540 AAC	
3:00 3:50	GCC 503 ***Exam*** 1-4 540 AAC	GCC 502 1-4:00 540 AAC		GCC 502 1-4:00 540 AAC	
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 14** **BIOTECHNOLOGY**

	Monday 12-03	**Tuesday** 12-04	**Wednesday** 12-05	**Thursday** 12-06	**Friday** 12-07
8:00 8:50	BTN 533 8:30-12 722 AAC Quiz #3	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
9:00 9:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
10:00 10:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
11:00 11:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
12:00 12:50					
1:00 1:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-4PM EXAM #2 976 AAC	GCC 502 1-4:00 540 AAC	
2:00 2:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-4PM EXAM #2 976 AAC	GCC 502 1-4:00 540 AAC	
3:00 3:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC	BTN 525 1-4PM EXAM #2 976 AAC	GCC 502 1-4:00 540 AAC	
4:00 4:50					
5:00 5:50					

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 15** **BIOTECHNOLOGY**

	Monday 12-10	**Tuesday** 12-11	**Wednesday** 12-12	**Thursday** 12-13	**Friday** 12-14
8:00 8:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC Quiz #4	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
9:00 9:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
10:00 10:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
11:00 11:50	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	BTN 533 8:30-12 722 AAC	
12:00 12:50	BTN 525 ***Manuscripts Due*** At Noon				
1:00 1:50	GCC 502 1-4:00 Quiz #4 540 AAC	GCC 502 1-4:00 540 AAC		GCC 502 ***Review*** 1-4:00 540 AAC	GCC 502 ***FINAL EXAM*** 1-4:30 540 AAC
2:00 2:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC		GCC 502 ***Review*** 1-4:00 540 AAC	GCC 502 ***FINAL EXAM*** 1-4:30 540 AAC
3:00 3:50	GCC 502 1-4:00 540 AAC	GCC 502 1-4:00 540 AAC		GCC 502 ***Review*** 1-4:00 540 AAC	GCC 502 ***FINAL EXAM*** 1-4:30 540 AAC
4:00 4:50					GCC 502 ***FINAL EXAM*** 1-4:30 540 AAC
5:00 5:50					

RUSH GRADUATE COLLEGE **FALL SEMESTER: 2018** **WEEK: 16** **BIOTECHNOLOGY**

	Monday 12-17	**Tuesday** 12-18	**Wednesday** 12-19	**Thursday** 12-20	**Friday** 12-21
8:00 8:50					
9:00 9:50	BTN 533 9-12 994AB AAC EXAM	BTN 525 9-12 *****PRESENTATIONS***** 976 AAC	BTN 525 9-12 *****PRESENTATIONS***** 976 AAC		
10:00 10:50	BTN 533 9-12 994AB AAC EXAM	BTN 525 9-12 *****PRESENTATIONS***** 976 AAC	BTN 525 9-12 *****PRESENTATIONS***** 976 AAC		
11:00 11:50	BTN 533 9-12 994AB AAC EXAM	BTN 525 9-12 *****PRESENTATIONS***** 976 AAC	BTN 525 9-12 *****PRESENTATIONS***** 976 AAC		
12:00 12:50					
1:00 1:50		BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	
2:00 2:50		BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	
3:00 3:50		BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	BTN 525 1-4 *****PRESENTATIONS***** 976 AAC	
4:00 4:50					
5:00 5:50					

RUSH UNIVERSITY

UNIVERSITY MISSION STATEMENT
Rush University provides outstanding health sciences education and conducts impactful research in a culture of inclusion, focused on the promotion and preservation of the health and well-being of our diverse communities.

Rush University Graduate College
Course Syllabus

Course Number	BTN 525
Course Title	Experimental Design & Models in Disease
Course Code	WE
Credit Hours	2 semester hours
Clinical Practicum/Clerkship Hours	N/a
Term and Year	FA 2018
Location (in-class sessions)	539 AAC, 540 AAC, 976 AAC, and Field Auditorium - Cohn
Course Coordinator/Course Director(s) Name and Contact Information	Paul Carvey, PhD Paul_Carvey@rush.edu 708-921-7942 976B AcFac Office Hours by appointment
Additional Course Faculty Information	N/a

Course Description	Designing experiments is an essential component of research. This course will provide the student the essential skills needed to design experiments. The course will focus on providing the students all the background needed to design experiments with an emphasis on actually designing exeriments (design types, threats to validity, factorial and clinical designs). The second part of the class will apply this material to experimental models (from in silico to in vivo) using living organisms from bacteria to non-human primates. The course will then require the student to research a disease, identify a major gap in the disease field, then develop and experimental design using non-human subjects to fill that gap. This will be implemented through a term paper and class presentation.
Course Objectives	At the completion of this course, the student will be able to: 1. Use the language of experimental design in a coherent fashion. 2. Use the threats to internal and external validity and apply them to a design to improve it. 3. Differentiate the various design types and be able to identify the design that best tests a question raised. 4. Identify what a true control is and add them appropriately to a design. 5. Relate to the ethical issues of animal model research and defend either a pro-animal or anti-animal stance on animal research. 6. Choose the appropriate animal for a research design and test it using various

	established methods.
Prerequisites	N/a
Co-requisites	N/a
Required Textbooks	N/a
Recommended Textbooks	N/a
Recommended Websites	N/a
EReserves Information	N/a
Required Equipment/ Uniform	N/a
Required Software/Online Tools	**My Apps:** https://myapps.rush.edu/ Students are recommended to use My Apps, which is a virtual desktop where Office software, Rush Email, and secure storage is provided. Visit https://rushuportal.learning.rush.edu/faq for more information about the My Apps virtual environment. Students are also able to log into RULearning from MyApps. **RULearning Login Page:** https://rulearning.rush.edu/ Students are also able to access RULearning via the listed login page. **Microsoft Office Suite: Word, Excel, and PowerPoint** If you do not already have the Microsoft Office software you can access the Suite through My Apps or download a copy of the Microsoft Office suite at a reduced cost for Windows or Mac users: https://rush.onthehub.com/ **Internet Browsers** Students should have access to more than one browser, such as Internet Explorer, Chrome, Firefox or Safari. All browsers should be the most up-to-date version available. **Adobe Acrobat Reader** Students should have access to the most up-to-date Adobe Acrobat Reader.
Internet Requirements	Students must have access to a high-speed internet connection when working off campus.

COURSE CONTENT				
DATES	**Content**	**Learning Activities***	**Assignments/ Assessments**	**% of Course Grade***
Week 1 9/5/18 1:00 p.m. – 3:00 p.m. Field Auditorium - Cohn	9/5/18 - Intro to design	Classroom lecture and discussion	Course notes Chapter 1	
Week 2 9/12/18 1:00 p.m. – 3:00 p.m. 539 AAC 9/14/18 10:00 a.m. – Noon 976 AAC	9/12/18 - Experimental Planning 9/14/18 - Statistical approach to design	Classroom lecture and discussion Classroom lecture and discussion	Course notes Chapter 2 Course notes Chapter 3	
Week 3 9/17/18 3:30 p.m. – 5:30 p.m. 976 AAC 9/19/18 1:00 p.m. – 3:00 p.m. 539 AAC	9/17/19 - Controls and Design types 9/19/19 – Threats to Validity, Error types and power analysis	Classroom lecture and discussion Classroom lecture and discussion	Course notes Chapter 4 Course notes Chapter 3, 13:004, and 5	
Week 4 9/25/18 3:30 p.m. – 5:30 p.m. 976 AAC	9/25/18 – Laboratory Design Types	Classroom lecture and discussion	Course notes Chapter 6	

Week 4 10/3/18 1:00 p.m. – 3:00 p.m. 976 AAC	10/3/18 – Clinical Design Types	Classroom lecture and discussion	Course notes Chapter 7	
Week 5 10/8/18 **EXAM I** 9 a.m. – Noon 540 AAC 10/10/18 1:00 p.m. – 3:00 p.m. 976 AAC	10/8/19 – **Exam #1** 10/10/18 – Introduction to Model Systems	Classroom lecture and discussion	Course notes Chapter 1-7 Course notes Chapter 8	**25%**
Week 6 10/17/18	10/17/18 - **No Class**			
Week 7 10/24/18 1:00 p.m. – 3:00 p.m. 976 AAC	10/24/18 – Vertebrate Models and Complex behavior	Classroom lecture and discussion	Course notes Chapter 8	
Week 8 10/31/18 1:00 p.m. – 3:00 p.m. 976 AAC	10/31/18 - Invertebrate Models	Classroom lecture and discussion	Course notes Chapter 9	
Week 9 11/07/18; 11/28/18 1:00 p.m. – 3:00 p.m. 976 AAC	11/07/18 - Culture systems and bacteria 11/28/18 – Practical approach to determining design type	Classroom lecture and discussion Classroom lecture and discussion	Course notes Chapter 10	
	12/05/18 - **Exam #2**		Course notes Chapter 1-10	**40%**

Week 10 12/05/18 1:00 p.m. – 4:00 p.m. **Exam** 976 AAC				
Week 11 12/10/18	****Manuscripts Due****			**20%**
Week 12 12/18/18, 12/19/18 9:00 a.m. – Noon 1:00 p.m. - 4 p.m. 12/20/18 1:00 p.m. – 4:00 p.m. 976 AAC	12/18/18 – 12/19/18 – 12/20/18 ****Presentations****			**15%**

Summary of Evaluation Methods of Student Performance
The student's final grade will be determined as follows: Mid-term 25% Final 40% Term Paper 20% Presentation 15% Total Points: 100%

Grading Policies	
Course Grading Scale	Final course grades are determined using the allocation of credit for each assignment and exam listed within Course Content. The grading scale for the course is as follows: 85-100% = A 70-84% = B 55-69% = C <54% = F
Timeframe for Reporting Grades	Exams scored with 1 week of exam Term Paper scored within 10 days Presentation scored real time
Assignment Submission	Manuscripts are Due December 10, 2018 by Noon (Hardcopy and PDF)
Late Assignments	5% per day deducted
Late Exams	Make-up exam
Attendance Expectations	Strongly encouraged
Participation Expectations	Strongly encouraged

COURSE COMMUNICATION	
Course Communication	The student will be able to effectively speak the language of experimental design. Notifications will be sent out via Blackboard and Dr. Carvey is always available after class and by appointment made via email. Class discussion will be extensive The material is best learned by active participation in the class. Dr. Carvey will present a question (e.g., do blondes have more fun?) and will then turn to the students to design a study to test the question. This generally occupies 25% of a class followed by lecture material that will be covered in the next session where another question will be posed.
Timeframe for faculty response to students	7-10 days
Expectations for professional	All students are expected to: 1. Show respect for other students and the instructors in the class.

behavior/ Netiquette	2. Be sensitive to the fact that there will be cultural and linguistic backgrounds, as well as different political and religious beliefs. 3. Express differences of opinion in a polite and rational way. 4. Maintain an environment of constructive criticism when commenting on the work of other students or the course. 5. Respect the privacy of other students. 6. Use good grammar and spelling. 7. Use salutations and titles in your messages. Formal titles (Dear Dr. Smith, Dear Professor, Dear Classmates) are always acceptable. It is also appropriate to end you note with a closing, (Thank you, Sincerely, Respectfully) when emailing students or faculty. 8. Be sure to say please and thank you. 9. Send only one message about a topic and wait for an answer. 10. Write your messages in formal language using sentences, capitalization, punctuation, and appropriate grammar.

STRATEGIES FOR SUCCESS

1. Create note cards for definitions.
2. Learning objectives will be one of the major focuses of the class so make sure you can answer each learning objective.
3. Participate in class as we design experiments.
4. Manuscripts should be professionally written with correct grammar and spelling using section headings as described in the course notes.
5. Presentations should be professional using power point slides that are not cluttered but creative.

RESOURCES and SUPPORT

Resources for Technology Problems	If you need help with RULearning, call the RULearning Help line at (312) 563-CLAS, option 2. The RULearning help line is available 24/7/365. If you need help with access to your Rush computer account or software, call the Rush University Help desk at (312) 563-CLAS, option 4.
Counseling Center	The Rush University Counseling Center offers free, confidential services to all currently enrolled Rush University students. The Center is staffed by clinical psychologists who can help you address a wide range of issues. For more information regarding the Center and its services call (312) 942-3687. All students, including distance learners, have access to the Student Assistance Program at 1-800-292-2780.

UNIVERSITY POLICIES

Academic Policies STANDARD	Students are responsible for following **all** Rush University policies and the policies that are specific to their college of admittance. Please refer to the Rush University Student Handbook and the relevant College Student Handbooks for more information. Selected policies are described below.
Disability Accommodations STANDARD	Rush University is committed to attracting and educating students who will help to make the health care profession representative of the national population, including individuals with disabilities. Part of Rush University's mission is to promote diversity among its student population and to provide equal access to its facilities, programs, services and learning opportunities. In keeping with this mission, the University encourages students with disabilities to engage the Office of Student Disability Services as soon as they begin their program.

	Students should contact **Marie Ferro-Lusk, Manager, Office of Student Disability Services** at Rush University, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings. Accommodations are not provided retroactively at the University. Additional information can be found online at the Office of Student Disability website or by contacting the Office of Student Disability Services. In order to respect students' privacy and ensure a thoughtful interactive discussion, students should not make accommodation requests to individual faculty members, lecturers, or course directors; instead, please contact: Marie Ferro-Lusk, MBA, MSW, LSW Manager, Office of Student Disability Services Phone: (312) 942-5237 Fax: (312) 942-2778 Email: Marie_S_Ferro-Lusk@rush.edu Website: https://www.rushu.rush.edu/students-disabilities
Honor Code and Academic Honesty	Students are expected to abide by the Rush Honor Code relating to academic integrity throughout all aspects of this course, including all assignments and exams. As trusted health care professionals, we take the issue of academic integrity very seriously and expect that you will adhere to the highest standards of integrity at all times. Rush University students and faculty belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. A partial list of academically dishonest behaviors that would subject a student to disciplinary action includes: • *Cheating*: Using unauthorized material or unauthorized help from another person in any work submitted for academic credit. • *Fabrication*: Inventing information or citations in an academic or clinical exercise. • *Facilitating Academic Dishonesty*: Providing unauthorized material or information to another person. • *Plagiarism*: Submitting the work of another person or persons, as one's own without acknowledging the correct source. • *Unauthorized Examination Behavior*: Conversing with another person, passing or receiving material to/from another person or temporarily leaving an examination site to visit an unauthorized site.
Intellectual Properties Protection	All materials contained within this syllabus, course and course materials, whether in written form or presented through video or audio transmission, represent the intellectual property of faculty or Rush University Medical Center. Students are prohibited from sharing or transmitting content or materials through any media without express consent or permission of the copyright holder.
Prohibition against Harassment, Discrimination, and Sexual Misconduct Policy	Click on link below to access the RUMC policy "Prohibition against Harassment, Discrimination, and Sexual Misconduct." The procedure for reporting harassment, discrimination, and/or sexual misconduct is found on p. 3. https://www.rushu.rush.edu/sites/default/files/_Rush%20PDFs%20and%20Files/sexual-harassment-policy-2014.pdf

RUSH UNIVERSITY

UNIVERSITY MISSION STATEMENT
Rush University provides outstanding health sciences education and conducts impactful research in a culture of inclusion, focused on the promotion and preservation of the health and well-being of our diverse communities.

Rush University Graduate College
Course Syllabus

Course Number	BTN 531
Course Title	Laboratory Techniques I
Course Code	FF
Credit Hours	2 semester hours
Clinical Practicum/Clerkship Hours	N/a
Term and Year	FA 2018
Location (in-class sessions)	540 AAC, 722 AAC, 994A AAC, 160 Cohn
Course Coordinator/Course Director(s) Name and Contact Information	Thomas Schmid, PhD tom_schmid@rush.edu 312-942-3051 Cohn Research Building, Room 524 Office Hours by Appointment Only Preferred Method of Contact: Email
Additional Course Faculty Information	Teaching Assistants: Larry Madsen (Lawrence_Madsen@rush.edu) 312-563-2435, AAC718, by apointment John Gallagher (John_J_Gallagher@rush.edu) 312-563-2435, AAC718, by appointment

Course Description	Introduction to laboratory techniques, basic techniques with proteins and cells, laboratory safety training and Good Laboratory Practices training with qualifying examination.
Course Objectives	At the completion of this course, the student will be able to: 1. Perform basic laboratory techniques and use basic laboratory equipment including micropipets, pH meters, and electronic balances. 2. Perform basic laboratory mathematics and calculations for making solutions, dilutions, and analyzing data using simple statistics. 3. Understand the nature and importance of Good Laboratory Practice (GLP), and pass a GLP examination. 4. Understand and discuss typical laboratory hazards and basic lab safety. 5. Perform routine cell culture techniques including feeding and passaging cell cultures without contamination.

Prerequisites	None, but general Chemistry, Biology and Cell Biology are preferred.
Co-requisites	N/a
Required Textbooks	N/a
Recommended Textbooks	On Reserve in the library: At the Bench by Kathy Barker, Cold Spring Harbor Press. Lab Math by Danny Spencer Adams, Cold Spring Harbor Press
Recommended Websites	N/a
EReserves Information	N/a
Required Equipment/ Uniform	Laboratory coat will be provided.
Required Software/Online Tools	**My Apps:** https://myapps.rush.edu/ Students are recommended to use My Apps, which is a virtual desktop where Office software, Rush Email, and secure storage is provided. Visit https://rushuportal.learning.rush.edu/faq for more information about the My Apps virtual environment. Students are also able to log into RULearning from MyApps. **RULearning Login Page:** https://rulearning.rush.edu/ Students are also able to access RULearning via the listed login page. **Microsoft Office Suite: Word, Excel, and PowerPoint** If you do not already have the Microsoft Office software you can access the Suite through My Apps or download a copy of the Microsoft Office suite at a reduced cost for Windows or Mac users: https://rush.onthehub.com/ **Internet Browsers** Students should have access to more than one browser, such as Internet Explorer, Chrome, Firefox or Safari. All browsers should be the most up-to-date version available. **Adobe Acrobat Reader** Students should have access to the most up-to-date Adobe Acrobat Reader.
Internet Requirements	Students must have access to a high-speed internet connection when working off campus.

COURSE CONTENT				
DATES	**Content**	**Learning Activities***	**Assignments/ Assessments**	**% of Course Grade***
Week 1 9/4/18, 9/5/18, 9/6/18, 9/7/18 8:30 a.m. - Noon 722 AAC	9/4/18 Introduction to BTN531, What is Biotechnology? Syllabus Review Introduction to GLP, GLP Notebooks-SOP 1 Using Micropipettes-SOP 2 9/5/18 Laboratory Math – Making solutions and buffers. Calibrating an instrument-SOP 3, 4 or 5 (*) pH meter, electronic balance, pipets 9/6/18 Calibrating an instrument-SOP 3,4 or 5 (*) Using electronic pipetters. Calculations practice QUIZ 9/7/18 Laboratory Math- Stock Solutions The centrifuge: rpm vs xg Calibrating an instrument-SOP 3, 4, or 5 (*)	Materials found in SOPs		SOPs – 20 points each
Week 2 9/10/18, 9/11/18, 9/12/18 8:30 a.m. - Noon 722 AAC 9/13/18	9/10/18 How do I make a buffer? SOP 6 9/11/18 Using Microscopes 9/12/18 Biohazards Microscope practical SOP 7. 9/13/18 Counting Cells with a	Materials found in SOPs		SOPs – 20 points each Exam - 40 points

8:30 a.m. – Noon 994A AAC	Hemocytometer – SOP 8 Lab book grading **Exam #1**			
Week 3 9/17/18, 9/18/18, 9/19/18, 9/20/18 8:30 a.m. - Noon 722 AAC	9/17/18 Cell culture of an immortalized cell line. Effect of %FBS on A549 cell growth – SOP 9 9/18/18 Hoof dissection Guest instructor – Larry Madson. Tissue culture of articular cartilage-SOP10 Laboratory Math: making complex solutions 9/19/18 Primary cell culture: Pronase and collagenase digestion of cartilage – SOP 10. 9/20/18 Plate chondrocytes – SOP10. Lab Math – setting up reactions.	Materials found in SOPs		SOPs – 20 points each
Week 4 9/24/18, 9/25/18 8:30 a.m. – 10:00 a.m. 722 AAC 9/26/18 8:30 a.m. - Noon 994A AAC 9/27/18, 9/28/18	9/24/18 Trypsinization and splitting of cells– SOP 11. Finish SOP 9. 9/25/18 Protein Assay and unknown– SOP 12 Spectrophotometer Lab book grading 9/26/18 **Exam #2** 9/27/18 Effect of cell microenvironment on chondrocyte	Materials found in SOPs		SOPs – 20 points each Exam - 40 points

8:30 a.m. - Noon 722 AAC	phenotype – SOP 13 Plate cells in monolayer, alginate & collagen 9/28/18 Chemical treatment of cells and assay for cell viability SOP 14			
Week 5 10/2/18 9:00 a.m. – 3 p.m. 976 AAC 10/3/18 9:00 a.m. – 1 p.m. 160 Cohn 10/4/18 9:00 a.m. – 11:00 a.m. 976 AAC 10/5/18 8:30 a.m. - Noon 722 AAC	10/2/18 Quality Assurance Associates Seminar by Paul Swidersky – full day. GLP Training. 10/3/18 Quality Assurance Associates Seminar by Paul Swidersky – half day. GLP Training. 10/4/18 GLP Certification Exam 10/5/18 Analyze morphology, cell number and matrix production for chondrocytes after one week of culture under different conditions. SOP 15	Materials found in SOPs		SOPs – 20 points each GLP Exam – 80 points
Week 6 10/9/18 8:30 a.m. - Noon 540 AAC	10/9/18 Pool and analyze class data. **Exam #3** **Lab Books collected and graded.** Check calibration of pipets – redo SOP 5	Materials found in SOPs		Exam - 40 points

Summary of Evaluation Methods of Student Performance

Course Format

The course is taught by a combination of lectures, and laboratory exercises performed by students working with a lab partner using Standard Operating Procedures (SOPs). However some experiments are performed individually by each student, and include practical exams and analysis of unknowns. The student should work on the laboratory skill being taught until s/he feels comfortable with the technique. Most of the experiments will be performed in groups of 2 students. Lab partners will be assigned randomly by the course director. Lab partners will be changed about half way through the class. Experiments should be performed equally by both students in each lab group. It is important that all students acquire all technical skills expected in each laboratory exercise (SOPs). For laboratory notebook write-ups, a background introduction is provided, as is the methods section. The data is shared between the two students in the group. However each student must analyze their data, answer any questions, and discuss their results individually. Each student in a group will turn in their own notebook for a grade. **Having the same or highly similar results and/or discussion sections by two students will be considered plagiarism.** Some experiments will involve the analysis of the data of the entire class. Groups are not allowed to use other groups' or other students' data unless they receive permission from Dr. Schmid. Success in this course implies that you can work in a laboratory with minimal to no training in these techniques using similar instruments.
Opportunity for additional assistance is available by making an appointment with the Course Director, or Teaching Assistants (see Office Hours, above).

Detailed knowledge about the experiments and the scientific theory that serves as a basis for these experiments will be tested on the formal examinations. A substantial portion (possibly up to 35%) of <u>each</u> exam will be on lab math and calculations relating to these experiments. The students who have the greatest difficulty with this course often lose points on the exams because of their difficulty to perform the lab math calculations correctly. Therefore it is important to practice your lab math, do calculation problems, and make sure you know how to do the calculations for each experiment before the exams. Dr. Schmid will give a "practice" exam before first real exam so you can assess your laboratory math skills. If help is needed on your lab math skills see Dr. Schmid, your Teaching Assistants, ask your fellow classmates for help, and/or use the recommended texts on reserve in the Library. Laboratory notebook grading expectations: You are expected to keep a Good Laboratory Practices notebook. The course director will provide a Standard Operating Procedure (SOP) for each experiment. It will include background theory, materials and methods, and experimental procedures for each experiment. These sections must be "permanently affixed" in your notebook (tape in all sides and sign and date). Include any changes made by you or the CD to the experiment. Record all experimental data and observations in your notebook. A copy of the data (and a copy of <u>only</u> the data) should be in your lab partner's notebook. Analyze your data (each lab partner should do this separately. You can discuss your group data with you lab partner, but each must write their own analysis in each one's lab notebook). Show examples of your calculations and label any spreadsheets clearly. Include any graphs or statistical analysis of your data in the notebook. Answer any questions provided by the CD. In early SOPS the CD will probably provide questions to guide your analysis. In later SOPs you are expected to interpret the results of your experiment and you may receive less questions for guidance. What happened in your experiment? What do your results tell you? Do not repeat what methods you used. The CD knows the methods used, he gave them to you. If you made a modification to the method and you thought it affected the results, then you should include this information. Did your experiment work? Why or why not? In some experiments the CD will give you a summary of all the data from all the groups. Then you will be expected to analyze your individual group's data and the class data. Describe anything that might improve the experiment. Lab notebook assessments represent a large part of your class grade.

Meeting Days and Times *(see table)*

Classes will be held from September 4, 2018 through Tuesday October 9, 2018. Class will begin at

8:30AM and finish by 12 noon. Please consult the class schedule for specific days. In general the laboratory classes will be held in AAC722.

If the student scores a 70% or greater on the Good Laboratory Practices exam, they will receive a certificate from **Quality Associates** certifying that they have successfully completed their Good Laboratory Practices training. This training and certificate may be very useful for future employment opportunities.

Grading Policies	
Course Grading Scale	Final course grades are determined using the allocation of credit for each assignment and exam listed within Course Content. The grading scale for the course is as follows: A = 90-100% B = 80-89% C = 70-79% **Grading Points** Notebook and performance 300 (15 SOPs, 20 points each) Exams 120 (3 exams) GLP Certification Exam 80 Total Points 500
Timeframe for Reporting Grades	In general examinations will be graded and reviewed with students within a week of the exam. Grading of laboratory notebooks is very labor intensive and may take up to 2 weeks after submission.
Assignment Submission	Laboratory notebooks will be collected in AAC722 during class, and in AAC718 while the TAs are present or outside the Cohn 5th floor elevator until 5PM of the due date.
Late Assignments	One point (5%) will be deducted for each day a lab notebook is not turned in on time.
Late Exams	Please see BTN handbook.
Attendance Expectations	Attendance is required at all lectures and laboratories. Work can only be made up, if at all, with a documented personal or family emergency – see BTN Program Statement of Attendance Policy. Students are expected to be on time for class. A sign in sheet will be posted before each class period. Students must sign in for each class. At 8:40AM or 10 minutes after the start of class the sign in sheet will be collected. Any student arriving more than 10 minutes late will be considered tardy for that class. Each student will receive one tardy day without penalty, after that one point (5%) will be deducted from the lab grade for that day.
Participation Expectations	For most experiments student will work in group pairs. In some experiments, especially lab technique practicals, the students will work independently (not in pairs) TBD BY FACULTY. The purpose of the discussion boards is to allow students to freely exchange ideas. It is imperative to remain respectful of all viewpoints and positions and, when necessary, agree to respectfully disagree. While active and frequent participation is encouraged, cluttering a discussion board with inappropriate, irrelevant, or insignificant material will not earn additional points and may result in receiving less than full credit. Frequency is not unimportant, but content of the message is paramount. Please remember to cite all sources—when relevant—in order to avoid plagiarism.

COURSE COMMUNICATION	
Course	Primary course communication is through the Blackboard shell for this course and

Communication	sometimes by email.
Timeframe for faculty response to students	Dr. Schmid will make every effort to respond to email in a timely manner usually within 2 days.
Expectations for professional behavior/ Netiquette	The purpose of this course is to provide laboratory training for professional researchers. Therefore it is expected that students in this course will strive to exemplify professional behavior. Unprofessional and rude behavior will not be tolerated, and will be penalized by deducting points from laboratory notebooks grades. Some examples of unprofessional and rude behavior are: disrespecting other students, teaching assistants and instructors, using cell phones or notebook computers during class lectures and lab experiments (laboratory notes should be written as raw data in your bound lab notebook), turning your back to a teacher during his or her lecture, sleeping in class, doing other coursework in class.

STRATEGIES FOR SUCCESS

See exam content and lab notebook expectations listed above.

RESOURCES and SUPPORT

Resources for Technology Problems	If you need help with RULearning, call the RULearning Help line at (312) 563-CLAS, option 2. The RULearning help line is available 24/7/365. If you need help with access to your Rush computer account or software, call the Rush University Help desk at (312) 563-CLAS, option 4.
Counseling Center	The Rush University Counseling Center offers free, confidential services to all currently enrolled Rush University students. The Center is staffed by clinical psychologists who can help you address a wide range of issues. For more information regarding the Center and its services call (312) 942-3687. All students, including distance learners, have access to the Student Assistance Program at 1-800-292-2780.

UNIVERSITY POLICIES

Academic Policies STANDARD	Students are responsible for following **all** Rush University policies and the policies that are specific to their college of admittance. Please refer to the Rush University Student Handbook and the relevant College Student Handbooks for more information. Selected policies are described below.
Disability Accommodations STANDARD	Rush University is committed to attracting and educating students who will help to make the health care profession representative of the national population, including individuals with disabilities. Part of Rush University's mission is to promote diversity among its student population and to provide equal access to its facilities, programs, services and learning opportunities. In keeping with this mission, the University encourages students with disabilities to engage the Office of Student Disability Services as soon as they begin their program. Students should contact **Marie Ferro-Lusk, Manager, Office of Student Disability Services** at Rush University, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings. Accommodations are not provided retroactively at the University. Additional information can be found online at the Office of Student Disability website or by contacting the Office of Student Disability Services. In order to respect students' privacy and ensure a thoughtful interactive discussion, students should not make accommodation requests to individual faculty

	members, lecturers, or course directors; instead, please contact: Marie Ferro-Lusk, MBA, MSW, LSW Manager, Office of Student Disability Services Phone: (312) 942-5237 Fax: (312) 942-2778 Email: Marie_S_Ferro-Lusk@rush.edu Website: https://www.rushu.rush.edu/students-disabilities
Honor Code and Academic Honesty	Students are expected to abide by the Rush Honor Code relating to academic integrity throughout all aspects of this course, including all assignments and exams. As trusted health care professionals, we take the issue of academic integrity very seriously and expect that you will adhere to the highest standards of integrity at all times. Rush University students and faculty belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. A partial list of academically dishonest behaviors that would subject a student to disciplinary action includes: • *Cheating*: Using unauthorized material or unauthorized help from another person in any work submitted for academic credit. • *Fabrication*: Inventing information or citations in an academic or clinical exercise. • *Facilitating Academic Dishonesty*: Providing unauthorized material or information to another person. • *Plagiarism*: Submitting the work of another person or persons, as one's own without acknowledging the correct source. • *Unauthorized Examination Behavior*: Conversing with another person, passing or receiving material to/from another person or temporarily leaving an examination site to visit an unauthorized site.
Intellectual Properties Protection	All materials contained within this syllabus, course and course materials, whether in written form or presented through video or audio transmission, represent the intellectual property of faculty or Rush University Medical Center. Students are prohibited from sharing or transmitting content or materials through any media without express consent or permission of the copyright holder.
Prohibition against Harassment, Discrimination, and Sexual Misconduct Policy	Click on link below to access the RUMC policy "Prohibition against Harassment, Discrimination, and Sexual Misconduct." The procedure for reporting harassment, discrimination, and/or sexual misconduct is found on p. 3. https://www.rushu.rush.edu/sites/default/files/_Rush%20PDFs%20and%20Files/sexual-harassment-policy-2014.pdf

RUSH UNIVERSITY

UNIVERSITY MISSION STATEMENT
Rush University provides outstanding health sciences education and conducts impactful research in a culture of inclusion, focused on the promotion and preservation of the health and well-being of our diverse communities.

Rush University Graduate College
Course Syllabus

Course Number	BTN 532
Course Title	Laboratory Techniques II
Course Code	FF
Credit Hours	2 semester hours
Clinical Practicum/Clerkship Hours	N/a
Term and Year	FA 2018
Location (in-class sessions)	539 AAC, 722 AAC
Course Coordinator/Course Director(s) Name and Contact Information	Thomas Schmid, PhD tom_schmid@rush.edu 312-942-3051 Cohn Research Building, Room 524 Office Hours by Appointment Only Preferred Method of Contact: Email
Additional Course Faculty Information	Larry Madsen (Lawrence_Madsen@rush.edu) 312-563-2435 John Gallagher (John_Gallagher@rush.edu) 312-563-2435

Course Description	Cell isolation and cell culture techniques. Experimentation with cell cultures; cell cycle, survival, protein and DNA content determination.
Course Objectives	At the completion of this course, the student will be able to: 1. Perform introductory protein purification techniques with minimal supervision. 2. Separate IgG and albumin from bovine serum using gel filtration and ion exchange chromatography. 3. Perform routine gel electrophoresis using a BioRad apparatus with precast gels or with their own manually casted acrylamide gels. 4. Measure the relative abundance of proteins on their stained gels using an image analysis system with protein standards. 5. Perform enzyme assays, ELISAs and Western blots in order to quantitate the levels of specific proteins in complex protein mixtures.
Prerequisites	None, but general Chemistry, Biology and Cell Biology are preferred
Co-requisites	N/a
Required Textbooks	N/a
Recommended Textbooks	On Reserve in the library: At the Bench by Kathy Barker, Cold Spring Harbor Press.

	Lab Math by Danny Spencer Adams, Cold Spring Harbor Press
Recommended Websites	N/a
EReserves Information	N/a
Required Equipment/ Uniform	Laboratory coat will be provided.
Required Software/Online Tools	**My Apps:** https://myapps.rush.edu/ Students are recommended to use My Apps, which is a virtual desktop where Office software, Rush Email, and secure storage is provided. Visit https://rushuportal.learning.rush.edu/faq for more information about the My Apps virtual environment. Students are also able to log into RULearning from MyApps. **RULearning Login Page:** https://rulearning.rush.edu/ Students are also able to access RULearning via the listed login page. **Microsoft Office Suite: Word, Excel, and PowerPoint** If you do not already have the Microsoft Office software you can access the Suite through My Apps or download a copy of the Microsoft Office suite at a reduced cost for Windows or Mac users: https://rush.onthehub.com/ **Internet Browsers** Students should have access to more than one browser, such as Internet Explorer, Chrome, Firefox or Safari. All browsers should be the most up-to-date version available. **Adobe Acrobat Reader** Students should have access to the most up-to-date Adobe Acrobat Reader.
Internet Requirements	Students must have access to a high-speed internet connection when working off campus.

Laboratory Safety
Laboratory safety training will be provided.

COURSE CONTENT				
DATES	**Content**	**Learning Activities***	**Assignments/ Assessments**	**% of Course Grade***
Week 1 10/10/18, 10/11/18, 10/12/18 8:30 a.m. - Noon 722 AAC	10/10/18 Chromatography: Gel Filtration /Gel Permeation 10/11/18 Chromatography: Ion Exchange 10/12/18 Chromatography: Affinity chromatography	Materials found in SOPs		SOPs – 20 points each
Week 2 10/15/18, 10/16/18, 10/17/18, 10/18/18 8:30 a.m. - Noon 722 AAC 10/19/18 8:30 a.m. - Noon 539 AAC	10/15/18 Electrophoresis: Precast gels 10/16/18 Electrophoresis: Image Analysis 10/17/18 Electrophoresis: Casting Polyacrylamide Gels 10/18/18 Electrophoresis: Discontinuous Gels 10/19/18 **Exam 1** + image analysis	Materials found in SOPs		SOPs – 20 points each Exam - 40 points
Week 3 10/22/18, 10/23/18, 10/24/18 8:30 a.m. - Noon 722 AAC 10/25/18 9:00 a.m. – Noon	10/22/18 Trypsin assay 10/23/18 Protease Assay: EnzChek 10/24/18 Protease Assay: EnzChek, ELISA 10/25/18 ELISA	Materials found in SOPs		SOPs – 20 points each

722 AAC				
Week 4 11/1/18, 11/2/18 8:30 a.m. – Noon 722 AAC	11/1/18 ELISA 11/2/18 **Exam 2**	Materials found in SOPs		SOPs – 20 points each Exam - 40 points
Week 5 11/8/18, 11/9/18 8:30 a.m. – Noon 722 AAC	11/8/18 Western Blot 11/9/18 Western Blot	Materials found in SOPs		SOPs – 20 points each
Week 6 11/16/18 8:30 a.m. – Noon 722 AAC	11/16/18 Western Blot	Materials found in SOPs		SOPs – 20 points each
Week 7 11/22/18	**Happy Thanksgiving!**			
Week 8 11/30/18 8:30 a.m. – Noon 710 – 713 AAC	11/30/18 **Final Exam and Lab notebooks collected**			Exam - 40 points

Summary of Evaluation Methods of Student Performance

Course Format

The course is taught by a combination of lectures, and laboratory exercises performed by students working with a lab partner using Standard Operating Procedures (SOPs). In general the lectures will be at the beginning of the class and last 1.5 h. The laboratory experiments are completed in the remainder of the class period. Some experiments are performed individually by each student, and include practical exams. The student should work on the laboratory skill being taught until s/he feels comfortable with the technique. Most of the experiments will be performed in groups of 2 students. Lab partners will be assigned randomly by the course director. Lab partners will be changed about half way through the class. Experiments should be performed equally by both students in each lab group. It is important that all students acquire all technical skills expected in each laboratory exercise (SOPs). For laboratory notebook write-ups, a background introduction is provided, as is the methods section. The data is shared between the two students in the group. However each student must analyze their data, answer any questions, and discuss their results individually. Each student in a group will turn in their own notebook for a grade. Having the same or highly similar results and/or discussion sections by two students will be considered plagiarism. Some experiments will involve the analysis of the data of the entire class. Groups are not allowed to use other groups' or other students' data unless they receive permission from Dr. Schmid. Success in this course implies that you can work in a laboratory with minimal to no training in these techniques using similar instruments.
Opportunity for additional assistance is available by making an appointment with the Course Director, or Teaching Assistants (see Office Hours, above).

Detailed knowledge about the experiments and the scientific theory that serves as a basis for these experiments will be tested on the formal examinations. If help is needed for understanding the experimental theory, experimental procedures or calculations see Dr. Schmid, your Teaching Assistants, ask your fellow classmates for help, and/or use the recommended texts on reserve in the Library.
Laboratory notebook grading expectations: You are expected to keep a Good Laboratory Practices notebook in a GLP format. The course director will provide a Standard Operating Procedure (SOP) for each experiment. It will include background theory, materials and methods, and experimental procedures for each experiment. These sections must be "permanently affixed" in your notebook (tape in all sides and sign and date). Include any changes made by you or the CD to the experiment. Record all experimental data and observations in your notebook. A copy of the data (and a copy of only the data) should be in your lab partner's notebook. Analyze your data (each lab partner should do this separately. You can discuss your group data with you lab partner, but each must write their own analysis in each one's lab notebook). Show examples of your calculations and label any spreadsheets clearly. Include any graphs or statistical analysis of your data in the notebook. Answer any questions provided by the CD. In some SOPS the CD will provide questions to guide your analysis. In other SOPs you are expected to interpret the results of your experiment and you may receive less questions for guidance. For one experiment you will be given experimental information, but you will have to write your own SOP. What happened in your experiment? What do your results tell you? In your results and discussion section do not repeat what methods you used. The CD knows the methods used, he gave them to you. If you made a modification to the method and you thought it affected the results, then you should include this information. Did your experiment work? Why or why not? In some experiments the CD will give you a summary of all the data from all the groups. Then you will be expected to analyze your individual group's data and the class data. Describe anything that might improve the experiment. Lab notebook assessments represent a large part of your class grade.

Meeting Days and Times (see table)

Classes will be held from Wednesday October 10, 2018 through Friday November 30, 2018. Class will begin at 8:30AM and finish by 12 noon. Please consult the class schedule for specific days. Laboratory lectures and labs will be held in AAC722.

Grading Policies	
Course Grading Scale	Final course grades are determined using the allocation of credit for each assignment and exam listed within Course Content. The grading scale for the course is as follows: A = 90-100% B = 80-89% C = 70-79% **Grading Points** Notebook and performance 160 (8 SOPs, 20 points each) Exams 120 (3 exams, 40 points each) Total Points 280
Timeframe for Reporting Grades	Examinations will be graded and reviewed with students within a week of the exam. Grading of laboratory notebooks is very labor intensive and may take up to 2 weeks after submission.
Assignment Submission	Laboratory notebooks will be collected in AAC722 during class, and in AAC718 while the TAs are present or outside the Cohn 5th floor elevator until 5PM of the due date.
Late Assignments	One point (5%) will be deducted for each day a lab notebook is not turned in on time.
Late Exams	Please see BTN handbook.
Attendance Expectations	Attendance is required at all lectures and laboratories. Work can only be made up, if at all, with a ***documented*** personal or family emergency – see **BTN Program Statement of Attendance Policy.** Students are expected to be on time for class. A sign in sheet will be posted before each class period. Students must sign in for each class. At 8:40AM or 10 minutes after the start of class the sign in sheet will be collected. Any student arriving more than 10 minutes late will be considered tardy for that class. Each student will receive one tardy day without penalty, after that one point (5%) will be deducted from the lab grade for that day.
Participation Expectations	For most experiments student will work in group pairs. In some experiments, especially lab technique practicals, the students will work independently (not in pairs). TBD BY FACULTY

COURSE COMMUNICATION	
Course Communication	Preferred Method of Contact: Email
Timeframe for faculty response to students	Dr. Schmid will make every effort to respond to email in a timely manner usually within 2 days.
Expectations for professional behavior/ Netiquette	The purpose of this course is to provide laboratory training for professional researchers. Therefore it is expected that students in this course will strive to exemplify professional behavior. Unprofessional and rude behavior will not be tolerated, and will be penalized by deducting points from laboratory notebooks grades. Some examples of unprofessional and rude behavior are: disrespecting other students, teaching assistants and instructors, using cell phones or notebook computers during class lectures and lab experiments (laboratory notes should be written as raw data in your bound lab notebook), turning your back to a

	teacher during his or her lecture, sleeping in class, doing other coursework in class.

STRATEGIES FOR SUCCESS

Proficiency at lab math and calculations were course objectives in BTN531, these skills are assumed for this BTN532 class, so they will not be as large a proportion of the points on BTN532 examinations as in BTN531. The calculations on BTN532 exams will primarily be the type of calculations that were necessary to determine the results of each SOP experiment. Therefore is would be a best practice to complete all lab notebook calculations and understand them before each examination. Like BTN531 the lab notebook grade is a higher proportion of the final grade than the examinations.

RESOURCES and SUPPORT

Resources for Technology Problems	If you need help with RULearning, call the RULearning Help line at (312) 563-CLAS, option 2. The RULearning help line is available 24/7/365. If you need help with access to your Rush computer account or software, call the Rush University Help desk at (312) 563-CLAS, option 4.
Counseling Center	The Rush University Counseling Center offers free, confidential services to all currently enrolled Rush University students. The Center is staffed by clinical psychologists who can help you address a wide range of issues. For more information regarding the Center and its services call (312) 942-3687. All students, including distance learners, have access to the Student Assistance Program at 1-800-292-2780.

UNIVERSITY POLICIES

Academic Policies STANDARD	Students are responsible for following **all** Rush University policies and the policies that are specific to their college of admittance. Please refer to the Rush University Student Handbook and the relevant College Student Handbooks for more information. Selected policies are described below.
Disability Accommodations STANDARD	Rush University is committed to attracting and educating students who will help to make the health care profession representative of the national population, including individuals with disabilities. Part of Rush University's mission is to promote diversity among its student population and to provide equal access to its facilities, programs, services and learning opportunities. In keeping with this mission, the University encourages students with disabilities to engage the Office of Student Disability Services as soon as they begin their program. Students should contact **Marie Ferro-Lusk, Manager, Office of Student Disability Services** at Rush University, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings. Accommodations are not provided retroactively at the University. Additional information can be found online at the Office of Student Disability website or by contacting the Office of Student Disability Services. In order to respect students' privacy and ensure a thoughtful interactive discussion, students should not make accommodation requests to individual faculty members, lecturers, or course directors; instead, please contact: Marie Ferro-Lusk, MBA, MSW, LSW Manager, Office of Student Disability Services Phone: (312) 942-5237 Fax: (312) 942-2778 Email: Marie_S_Ferro-Lusk@rush.edu Website: https://www.rushu.rush.edu/students-disabilities

Honor Code and Academic Honesty	Students are expected to abide by the Rush Honor Code relating to academic integrity throughout all aspects of this course, including all assignments and exams. As trusted health care professionals, we take the issue of academic integrity very seriously and expect that you will adhere to the highest standards of integrity at all times. Rush University students and faculty belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. A partial list of academically dishonest behaviors that would subject a student to disciplinary action includes: • *Cheating*: Using unauthorized material or unauthorized help from another person in any work submitted for academic credit. • *Fabrication*: Inventing information or citations in an academic or clinical exercise. • *Facilitating Academic Dishonesty*: Providing unauthorized material or information to another person. • *Plagiarism*: Submitting the work of another person or persons, as one's own without acknowledging the correct source. • *Unauthorized Examination Behavior*: Conversing with another person, passing or receiving material to/from another person or temporarily leaving an examination site to visit an unauthorized site.
Intellectual Properties Protection	All materials contained within this syllabus, course and course materials, whether in written form or presented through video or audio transmission, represent the intellectual property of faculty or Rush University Medical Center. Students are prohibited from sharing or transmitting content or materials through any media without express consent or permission of the copyright holder.
Prohibition against Harassment, Discrimination, and Sexual Misconduct Policy	Click on link below to access the RUMC policy "Prohibition against Harassment, Discrimination, and Sexual Misconduct." The procedure for reporting harassment, discrimination, and/or sexual misconduct is found on p. 3. https://www.rushu.rush.edu/sites/default/files/_Rush%20PDFs%20and%20Files/sexual-harassment-policy-2014.pdf

RUSH UNIVERSITY

UNIVERSITY MISSION STATEMENT
Rush University provides outstanding health sciences education and conducts impactful research in a culture of inclusion, focused on the promotion and preservation of the health and well-being of our diverse communities.

Rush University Graduate College
Course Syllabus

Course Number	BTN 533
Course Title	Laboratory Techniques III
Course Code	FF
Credit Hours	2 semester hours
Clinical Practicum/Clerkship Hours	N/a
Term and Year	FA 2018
Location (in-class sessions)	722 AAC, 994AB AAC
Course Coordinator/Course Director(s) Name and Contact Information	Dan Predescu, M.D. dan_predescu@rush.edu 312-563-2436 Building, Room 1415 A Jelke Any Discussion, inquiry or proctoring activity should be done by appointment only.
Additional Course Faculty Information	N/a

Course Description	Basic and extended molecular biology techniques; DNA and RNA work, cloning and protein expression techniques.
Course Objectives	The course is created to provide the students with the necessary skills required in a Molecular Biology Laboratory. The course intends to: 1. Enhance the student's ability to identify the critical elements of basic technique or procedure, in order to solve questions for which documented answers are not close at hand 2. Clarify the everyday practice of the methods taken for granted, yes very often misused, wrongly applied or misinterpreted 3. Develop critical thinking related to the subjects from syllabus 4. Improve and verify students' skills in order to prepare them for work in a molecular biology lab, 5. Develop the basic laboratory techniques of a biotechnology or bioscience lab, 6. Develop critical thinking skills in the students 7. Encourage teamwork and accountability among the students 8. Practice accuracy in calculations and in writing scientifically 9. Develop multitasking skills 10. Encourage students to take charge of their learning

	BTN 533 is designed as an introductory course to basic skills of molecular biology. The purpose of this course is to give students "hands-on experience" with the fundamental techniques of molecular biology, as well as an understanding of their applications. At the end of the course you should be familiar if not have learned the following techniques: • Isolation of microbial and mammalian DNA • Genomic DNA digestion (restriction digestion) • Agarose gel Electrophoresis and visualization of DNA in gels • Ligation of foreign DNA to create recombinant molecules, molecular cloning • Bacterial transformation, Selection of positive colonies, Analysis of transformants • Isolation of plasmid DNAs • Amplification of a DNA fragment by the Polymerase Chain Reaction (PCR) • Genotyping by PCR • Reverse transcriptase PCR (RT-PCR), q PCR – • Viruses lytic cycle, viral detection • Cell types, fate, differentiation and removal • Basic informatics tools for genome analysis
Prerequisites	N/a
Co-requisites	N/a
Required Textbooks	N/a
Recommended Textbooks	1. Short Protocols in Molecular Biology, by F. M Ausubel et all, John Wiley & Sons Inc. ISBN 0-471-32938-X 2. Shoestring Biotechnology, by Kathy Frame (ed.). National Association of Biology Teachers (2002) 3. Basic Laboratory Methods for Biotechnology, by Lisa A. Seidman & Cynthia J. Moore. Prentice Hall (1999) 4. Seidman & Moore, Basic Laboratory Methods for Biotechnology: Textbook & Laboratory Reference, 2nd edition. 2009. Prentice Hall. ISBN: 0321570146
Recommended Websites	1. Dolan DNA Learning Center: www.dnalc.org 2. Molecular Biology Problem Solver edited by Alan S. Gerstein ISBN 0-471-37972-7 3. Geospiza web site (www.geospiza.com) 4. Bio-link web site (www.bio-link.org) 5. Laboratory security: http://ehs.uky.edu/ohs/labsecurity.html 6. Bio.org: http://www.bio.org/about_biotech/
EReserves Information	N/a
Required Equipment/ Uniform	Students must wear at all-time: ***LABORATORY COATS***, long pants, full length skirts, complete shoe and goggles as needed. Long hair must be tighten and covered with a hat. ***NO FOOD OR DRINKS ARE ALLOWED IN THE LAB.***
Required Software/Online Tools	**My Apps:** https://myapps.rush.edu/ Students are recommended to use My Apps, which is a virtual desktop where Office software, Rush Email, and secure storage is provided. Visit https://rushuportal.learning.rush.edu/faq for more information about the My Apps virtual environment. Students are also able to log into RULearning from MyApps. **RULearning Login Page:** https://rulearning.rush.edu/

	Students are also able to access RULearning via the listed login page. **Microsoft Office Suite: Word, Excel, and PowerPoint** If you do not already have the Microsoft Office software you can access the Suite through My Apps or download a copy of the Microsoft Office suite at a reduced cost for Windows or Mac users: https://rush.onthehub.com/ **Internet Browsers** Students should have access to more than one browser, such as Internet Explorer, Chrome, Firefox or Safari. All browsers should be the most up-to-date version available. **Adobe Acrobat Reader** Students should have access to the most up-to-date Adobe Acrobat Reader.
Internet Requirements	Students must have access to a high-speed internet connection when working off campus.

Laboratory Safety

The purpose of this course is to provide a worthwhile laboratory experience which demands strict adherence to prescribed rules for personal and environmental safety and this is the #1 prerequisite expected from every student attending BTN 533. The former reflects concern for your personal safety in terms of avoiding laboratory setting to prevent:
i) Laboratory accidents or extended contamination,
ii) Unwanted exposure to physical agents and chemical reagents,
iii) Disrespectful conduct and anti-collegial attitudes,
iv) Tampering or contamination of experimental procedures by exogenous influences.

Instruments and Equipment Usage/Handling: An important part of working in any laboratory is the proper use and calibration of instruments and equipment. You will become familiar with general information about the use of lab equipment, as well as more detailed information about the step-by-step procedures for the specific instruments that you use.

Includes: Basic Tools in the Biotechnology Laboratory
Using, maintaining and calibrating a Micropipette
Calibrating Lab Instruments balances and pH meters
Restriction Enzyme Mapping of DNA
Agarose gel electrophoresis
GFP and plasmid isolation using chromatography columns,
DNA Fingerprinting:
PCR thermal cycler
qPCR

Regulatory Affairs

Purpose: You will work on writing skills and how to follow Standard Operating Procedures (SOPs) and fill out forms, in the laboratory. The regulations governing biological laboratories dictate the safety procedures and protocols for disposal of hazardous chemicals and biologicals.

Includes: Safety in the Laboratory
Documentation and the Lab Notebook Supplemental —SOP
Solution Preparation & Gel Electrophoresis form

COURSE CONTENT				
DATES	**Content**	**Learning Activities***	**Assignments/ Assessments**	**% of Course Grade***
Week 1 10/29/18, 10/30/18, 10/31/18 8:30 a.m. - Noon 722 AAC	**10/29/18 - Lectures** Welcome Class of 2018 What is biotechnology? Safety rules in a Molecular Biology laboratory Toward the digital laboratory **10/30/18 – Hands on** Fast methods for: DNA and RNA assays; testing of pipetting skills (SOP #1and 2); **10/31/18 –** Working with bacteria I: Growing bacteria, bacterial culture, media preparation (SOP #3);	The materials (pptx presentations) for every class will be provided one week in advance to the whole class via email and posted on Blackboard. SOP#1, #2 and 3 will be provided as above, and every student will receive a printed copy in the day of the class	Student Presentation I Title and content to be chosen by the designated team. Student Presentation II For title and content see above. All lectures are power point presentations by the member of the same pair. "Molecular Biology in the News" activities will be offered to all if agreed upon, but they will be mandatory for everyone accumulating *5 "lethargic starts"* as described in attendance section.	N/a
Week 2 11/05/18, 11/06/18, 11/07/18 8:30 a.m. - Noon 722 AAC	**11/05/18 – Hands on** - Isolation of Genomic and Plasmid DNA from bacteria, (SOP #4 and #5); **11/06/18 - Hands on** Human genomic DNA from cells (SOP#6) **11/07/18** – **Hands on** Quiz 1 Mouse Genotyping: (SOP#7) and Drosophila Genotyping, (SOP #8);	Discuss the content of SOPs 4, 5, 6, 7, and 8 (every pair will present the content of one SOP)	Student Presentation III The title and the content will be determined as above. Student Presentation IV See above for title and content.	Quiz I (weeks ½ ; 18 Q from SOPs 1-3) Each Q =5 points Skill testing; pass or fail
Week 3 11/12/18, 11/13/18, 11/14/18, 11/15/18 8:30 a.m. -	**11/12/18 – Hands on** Agarose gel electrophoresis: pouring, running, imaging, - the basics (SOP #9); **11/13/18 – Hands on**	Discuss the content of SOPs for every class. A pair of students will have to present and Discuss the content of SOP/SOPs for that day.	Student Presentation V Student presentation VI	

Noon 722 AAC	Working with bacteria II / bacterial transformation-pGLO- (SOP #10) / β-Gal (SOP#11); **11/14/18 – Hands on** Working with bacteria III: GFP isolation (SOP #12); Skill testing; **11/15/18 – Hands on** Working with bacteria IV: GFP characterization II (SOP #13), SDS-PAGE;		Student presentation VII Student presentation VIII	Skill testing pass or fail) Skill testing (pass or fail)
Week 4 11/19/18, 11/20/18 8:30 a.m. - Noon 722 AAC	**11/19/18 – Hands on** Working with bacteria V; GFP / β-Gal data analysis (SOP #14); **11/20/18 - Hands on** Quiz 2 Viral infection / (SOP #15); Viral nature of diseases (SOP#16)	Discuss the content of SOPs for every class. A pair of students will have to present and Discuss the content of SOP/SOPs for that day.	Student presentation IX Student presentation X First Note Book (NB) survey	Quiz II (20 Q, each for 5 points from SOPs 9 to 14) Skill testing pass or fail
Week 5 11/26/18, 11/27/18, 11/28/18, 11/29/18 8:30 a.m. - Noon 722 AAC	**11/26/18 – Hands on** Gene Cloning I; Restriction Digestion/Ligation (SOP # 17 and #18); Gene Cloning II: Ligation continued, selections of new clones (SOP # 19); **11/27/18 – Hands on** Gene Cloning III: Data analysis for gene cloning (SOP #20); **11/28/18 – Hands on** Cell culture I: eukaryotic cell culture-basics staining/counting (SOP # 21); and Cell culture II: mammalian cell types (SOP#22); **11/29/18 – Hands on** PCR I: Introduction, basics, primer design (SOP #23 –one step PCR and SOP #24 – GMO content of	Discuss the content of SOPs for every class. A pair of students will have to present and Discuss the content of SOP/SOPs for that day.	Student presentation XI Student presentation XII NB survey II Student presentation XIII Student presentation XIV NB survey III	Skill testing; Skill testing pass or fail

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Week 6 12/3/18, 12/4/18, 12/5/18, 12/6/18 8:30 a.m. - Noon 722 AAC	**12/3/18 – Hands on** Quiz 3 PCR II: Mt-DNA analysis (SOP #25); finishing genotyping (SOP #26); **12/4/18 – Hands on** RT-PCR: HIV application (SOP #27); **12/5/18 – Hands on** PCR III: Exploring genetics of taste by PCR 9SOP#28) **12/6/18 – Hands on** DNA analysis based on chip methodology- genes involved in Lung Cancer (SOP #29)	Discuss the content of SOPs for every class. A pair of students will have to present and Discuss the content of SOP/SOPs for that day.	Student presentation XV Student presentation XVI NB assessment I	 Quiz III (20 Q, each for 5 points from SOPs 15 to 24) Skill testing Skill testing
Week 7 12/10/18, 12/11/18, 12/12/18, 12/13/18 9:00 a.m. - Noon 722 AAC	**12/10/18 – Hands on** qPCR- introduction (SOP #30); (classic PCR that will be used for qPCR) **12/11/18 – Hands on** Quiz 4 qPCR for GMO foods (SOP#31) **12/12/18 – Lecture and Hands on** Data analysis for qPCR – (SOP#32) bioinformatics tools; ***Lecture by DP*** qPCR- applications and new development –	Discuss the content of SOPs for every class. A pair of students will have to present and Discuss the content of SOP/SOPs for that day.	**NB assessment II** Open session of Q and direct discussions regarding the FX. The session will be a brain storming format with short examples (quick 5-6 Q) that will be graded by each student.	 Quiz IV (20 Q, each for 5 points from SOPs 25 to 30) Skill testing;

	12/13/18 –Practice for FX			
Week 8 12/20/18 8:30 a.m. - Noon **F I N A L E X A M** 994AB AAC	12/20/18 - **F I N A L E X A M**		a # of 90 Q from the SOPs for 1 point each and 5 short (3-4 sentences) essays covering the subjects from SOPs for 2 points each	Final Exam – 30 points

Summary of Evaluation Methods of Student Performance

The student's final grade will be based on attendance, cumulative experimental performance, laboratory Note Book, assignments, quiz and examination. Attendance will be taken within the first 5 minutes at the beginning of class and punctual attendance will count towards the final grade. The class is governed by the rules and regulations of the Rush University Academic policies and honesty as stated in the Rush University Bulletin. Links to these policies are given as follows:
http://www.rushu.rush.edu/bulletin/academicpolicies.html
http://www.rushu.rush.edu/bulletin/acadhon.html

The following benchmarks will be considered for every grade:

Laboratory Notebook	20%
Laboratory Performance – skills -	31%
Quizzes	6%
Cumulative Final Examination	30%
Introductory lecture	5%
Attendance	8%

Total Points: 100 pts

Grading Policies

Course Grading Scale	Final course grades are determined using the allocation of credit for each assignment and exam listed within Course Content. The grading scale for the course is as follows: A= 90%–100% B= 80%–89% C= 70%–79%
Timeframe for Reporting Grades	Grades are expected a week after assessment.
Assignment Submission	N/a
Late Assignments	N/a
Late Exams	No make-ups are allowed for laboratory work, examination or quiz except when advance permission from the course director is obtained. Permission will be granted only under exceptional circumstances and must be accompanied with a documented letter (see **BTN Program Statement of Attendance Policy).**
Attendance Expectations	***Full attendance at all laboratory sessions is required for all students.*** Being present in the class is recorded at the beginning (8:30 am) under your signature. **Showing up 15 or more minutes after, the starting of a class, will be considered unpunctuality and after 3 "lethargic accumulations"** the student will have deducted 1% from its/hers attendance. After *5 "lethargic starts*" a recovery of student attitude will be done by the Director of BTN program at Rush (Dr. G Szabo); *and a makeup of time missed will be well thought-out between the student and the Course Director.*
Participation Expectations	The student class participation grade will be determined by attendance record, level of involvement during in-class and if needed out-of-class activities (including group Learning), and by the quantity and quality of your contributions during presentations and daily morning discussions. In

	addition, you will have an opportunity to earn additional credit towards class, or to repair your participation with the “Molecular Biology in the News” activities. These will be described, established and fulfilled in class.

COURSE COMMUNICATION	
Course Communication	It is recommended that e-mail be used as much as possible when students have questions. If you wish to meet with the instructor, it is best to arrange appointments through email.
Timeframe for faculty response to students	24 hours
Expectations for professional behavior/ Netiquette	**General etiquette:** There are special approaches and precautions that must be taken in any biological laboratory. This includes procedures for safe handling and storage of hazardous chemicals and biologicals. Also, the special methods for setting up and following detailed protocols are emphasized, as well as methods for recording and archiving results properly. **Email use** is allowed for communications with the personnel of the course or Graduate College. IT IS NOT PERMITED TO use, check it or Discuss with other students during laboratory time. **Blackboard use.** The purpose of the blackboard is to allow students to freely exchange ideas. Thus its usage, during laboratory time, is permitted for transmitting, learning and Discussing the content, results and/or hypothesis related to the SOP and/or presentation of the day. In consequence NO COMERCIAL, PERSONAL, SOCIAL and POLITICAL announcements are allowed.

STRATEGIES FOR SUCCESS

The final important aspect of BTN 533 class is making the students aware of the Safety Rules which govern the work in a Molecular biology Lab.

Keep your Note Book: i) clean and well organized, ii) have all SOPs in their numeric succession and do not forgive to assign them the pages in the table of content, iii) have them ready for inspection by the teacher –will be done twice during the course of the class, iv) complete any assignment requested by the SOP and have (write down) your opinion at the end of each working day, do not forget: YOUR OPINION MATTERS.

Perform your duties for each class, as discussed every morning. Concentrate and pay attention when you perform the methods, the results are the proof of your skills and this part share the same weight as the FEX for your performance. When it comes to skills the way in which you present, how you participate in the morning discussions and cooperate with your colleagues will be part of your grade. If the student(s) have anything to say or to talk about the instructor and the two TA will be available at any time point during the class as well as immediately after class. Any concern, worry or misunderstanding expressed will be evaluated and a time for resolution will be provided.

Be present when the methods and indications are discussed every morning for the daily SOPs and the plans as well as the strategy, content and any matter of concern regarding the FEX are debated –one week before FEX. Who choose not to attend, is the loser.

For the final exam 6 to 10 Q will be from the first class- particular emphasis on the SI and safety rules and signs in a Molecular Biology Lab.

A signup statement of Laboratory Safety Rules will be provided to each student who MUST read it, agree with it, signed and have it past at the very beginning of the Note Book.

How do I ensure that everyone has an equal opportunity to succeed in the class?

As your professor, I am responsible for ensuring that all students compete on a level playing field. A student who is academically dishonest is claiming an advantage not available to other students. If you ever have a question about the expectations concerning a particular assignment or project in this course, be sure to ask Dr. Dan Predescu for clarification. You are encouraged to work with your colleagues to do the problem sets and to discuss the SOP content, even your feelings about it; -science is a collaborative affair. However, your participation (presentations, skill testing, quizzes) and exams should be your intellectual property only (or that of your group, if it is a group assignment). **Any time you use information from review papers or other articles, be sure to properly cite your sources**. Any type of plagiarism or cheating will be dealt with harshly as detailed in RU written policies detailed under **Honor Code and Academic Honesty**.

RESOURCES and SUPPORT

Resources for Technology Problems	If you need help with RULearning, call the RULearning Help line at (312) 563-CLAS, option 2. The RULearning help line is available 24/7/365. If you need help with access to your Rush computer account or software, call the Rush University Help desk at (312) 563-CLAS, option 4.
Counseling Center	The Rush University Counseling Center offers free, confidential services to all currently enrolled Rush University students. The Center is staffed by clinical psychologists who can help you address a wide range of issues. For more information regarding the Center and its services call (312) 942-3687. All students, including distance learners, have access to the Student Assistance Program at 1-800-292-2780.

UNIVERSITY POLICIES	
Academic Policies STANDARD	Students are responsible for following **all** Rush University policies and the policies that are specific to their college of admittance. Please refer to the Rush University Student Handbook and the relevant College Student Handbooks for more information. Selected policies are described below.
Disability Accommodations STANDARD	Rush University is committed to attracting and educating students who will help to make the health care profession representative of the national population, including individuals with disabilities. Part of Rush University's mission is to promote diversity among its student population and to provide equal access to its facilities, programs, services and learning opportunities. In keeping with this mission, the University encourages students with disabilities to engage the Office of Student Disability Services as soon as they begin their program. Students should contact **Marie Ferro-Lusk, Manager, Office of Student Disability Services** at Rush University, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings. Accommodations are not provided retroactively at the University. Additional information can be found online at the Office of Student Disability website or by contacting the Office of Student Disability Services. In order to respect students' privacy and ensure a thoughtful interactive Discussion, students should not make accommodation requests to individual faculty members, lecturers, or course directors; instead, please contact: Marie Ferro-Lusk, MBA, MSW, LSW Manager, Office of Student Disability Services Phone: (312) 942-5237 Fax: (312) 942-2778 Email: Marie_S_Ferro-Lusk@rush.edu Website: https://www.rushu.rush.edu/students-disabilities
Honor Code and Academic Honesty	Students are expected to abide by the Rush Honor Code relating to academic integrity throughout all aspects of this course, including all assignments and exams. As trusted health care professionals, we take the issue of academic integrity very seriously and expect that you will adhere to the highest standards of integrity at all times. Rush University students and faculty belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. A partial list of academically dishonest behaviors that would subject a student to disciplinary action includes: • *Cheating*: Using unauthorized material or unauthorized help from another person in any work submitted for academic credit. • *Fabrication*: Inventing information or citations in an academic or clinical exercise. • *Facilitating Academic Dishonesty*: Providing unauthorized material or information to another person. • *Plagiarism*: Submitting the work of another person or persons, as one's own without acknowledging the correct source. • *Unauthorized Examination Behavior*: Conversing with another person, passing or receiving material to/from another person or temporarily leaving an examination site to visit an unauthorized site.
Intellectual	All materials contained within this syllabus, course and course materials,

Properties Protection	whether in written form or presented through video or audio transmission, represent the intellectual property of faculty or Rush University Medical Center. Students are prohibited from sharing or transmitting content or materials through any media without express consent or permission of the copyright holder.
Prohibition against Harassment, Discrimination, and Sexual Misconduct Policy	Click on link below to access the RUMC policy "Prohibition against Harassment, Discrimination, and Sexual Misconduct." The procedure for reporting harassment, discrimination, and/or sexual misconduct is found on p. 3. https://www.rushu.rush.edu/sites/default/files/_Rush%20PDFs%20and%20Files/sexual-harassment-policy-2014.pdf

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Rush University Graduate College
Course Syllabus

Course Number	GCC 501
Course Title	Molecular Biology: Genome to Proteome
Course Code	WE
Credit Hours	3 semester hours
Clinical Practicum/Clerkship Hours	N/a
Term and Year	FA 2018
Location (in-class sessions)	540 AAC, 976 AAC
Course Coordinator/Course Director(s) Name and Contact Information	Sanda Predescu, PhD sanda_predescu@rush.edu 312-563-2437 Jelke Building, Room 1535 Office Hours upon request
Additional Course Faculty Information	Nell_Lurain@rush.edu; 312 942 8734, 859 Jelke, Monday to Friday by appointment Sasha_Shafikhani@rush.edu; 312 942 1368; 612 Cohn Tom_Schmid@rush.edu, 312 942 3015, 622 Cohn, Dan_Predescu@rush.edu; 312 563 2436, Jelke 1415, Monday to Friday by appointment Jitesh_Pratap@rush.edu; 312 563 4633, Jelke 1409B, Monday to Friday by appointment Carl_Maki@rush.edu;312 563 3380, Jelke 1409A, Monday to Friday by appointment

Course Description	DNA structure, replication, recombination, cloning, sequencing and related topics will be covered. This course will continue with organization of the human genome, the cell cycle, genetic mapping and relationships between genes and diseases. Transcriptional and translational regulations will be included.
Course Objectives	Upon completion of this course, students will be able to demonstrate: 1. essential principles and processes of molecular biology and human genetics. 2. basic methods and current experimental techniques used in biological research. 3. major unifying principles that applies to all living organisms.
Prerequisites	N/a
Co-requisites	N/a

Required Textbooks	**Molecular Cell Biology** 8th Edition, 2016 - Lodish et al. W. H. Freeman Publisher **Genome 4** 4th Edition – T. A. Brown Publisher Taylor & Francis
Recommended Textbooks	**Genetics and Genomics in Medicine** Edition: 1st Tom Strachan, Judith Goodship, Patrick Chinnery Garland Science
Recommended Websites	N/a
EReserves Information	N/a
Required Equipment/ Uniform	N/a
Required Software/Online Tools	**My Apps:** https://myapps.rush.edu/ Students are recommended to use My Apps, which is a virtual desktop where Office software, Rush Email, and secure storage is provided. Visit https://rushuportal.learning.rush.edu/faq for more information about the My Apps virtual environment. Students are also able to log into RULearning from MyApps. **RULearning Login Page:** https://rulearning.rush.edu/ Students are also able to access RULearning via the listed login page. **Microsoft Office Suite: Word, Excel, and PowerPoint** If you do not already have the Microsoft Office software you can access the Suite through My Apps or download a copy of the Microsoft Office suite at a reduced cost for Windows or Mac users: https://rush.onthehub.com/ **Internet Browsers** Students should have access to more than one browser, such as Internet Explorer, Chrome, Firefox or Safari. All browsers should be the most up-to-date version available. **Adobe Acrobat Reader** Students should have access to the most up-to-date Adobe Acrobat Reader.
Internet Requirements	Students must have access to a high-speed internet connection when working off campus.

COURSE CONTENT				
DATES	**Content**	**Learning Activities***	**Assignments/ Assessments**	**% of Course Grade***
Week 1 *1:00 – 4:00* *Tuesday* *09.04.2018* *540 AAC* *Thursday* *1:00 – 4:00* *09.06.2018* *540 AAC*	Introduction to **MOLECULAR BIOLOGY & HUMAN GENETICS** course (Dr. Sanda Predescu) **Lecture 1.** DNA structure and biochemical characteristics, prokaryotic vs. eukaryotic organisms, Gene transfer mechanisms, mobile DNA, chromosome packaging, DNA replication (Dr. Nell Lurain) **Lecture 2.** Genetic code, mutagenesis, recombination; DNA repair mechanisms (Dr. Nell Lurain)	- provide information orally, supported by slides, handouts and Panopto recording; - short interactions such as asking students to respond to related questions; - provide information orally, supported by slides, handouts and Panopto recording; - short interactions such as asking students to respond to related questions; - small group activities/ assignments; - clinical correlations;	- assign reading text/chapter; - assign reading text/chapter;	
Week 2 *1:00 – 4:00* *09.10.2018* *540 AAC* *1:00 – 4:00* *09.11.2018* *540 AAC* *1:00 – 4:00* *09.13.2018* *540 AAC*	**Lecture 3.** Recombinant DNA: principles, DNA cloning techniques and strategies (Dr. Nell Lurain) Quiz 1 **Lecture 4.** Identifying and analyzing genomic DNA and recombinant molecules (Dr. Nell Lurain) **Lecture 5**. RNA structure and transcription apparatus of prokaryotes. Inheritance of genes in Bacteria (Dr. Sasha Shafikhani)	-provide information orally, supported by slides, , handouts and Panopto recording; -short interactions such as asking students to respond to a related questions; -small group activities – case study - provide information orally, supported by slides, handouts and Panopto recording; - short interactions such as asking students to respond to a related questions; small group activities/assignments – clinical correlations;	- assign reading text/chapter; - assign study guide for the quiz; - assign reading text/chapter;	**5 points**

Week 3 *1:00 – 4:00* *09.17.2018* *540 AAC*	**Lecture 6.** Transcriptional control of gene expression: regulatory elements in prokaryotes vs. eukaryotes. Analysis of promoters and DNA-binding proteins (Dr. S. Predescu).	- provide information orally, supported by slides, , handouts and Panopto recording; - short interactions such as asking students to respond to a related questions; - small group activities/ assignments; - clinical correlations;	- assign reading text/chapter; - assign study guide for the quiz;	
	Quiz 2			**5 points**
1:00 – 4:00 *09.18.2018* *540 AAC*	**Lecture 7**. Post-transcriptional gene control: synthesis and processing of prokaryotic and eukaryotic organisms. RNA capping, polyadenylation, and splicing. Role of snRNPs, RNA editing and chemical modifications (Dr. Dan Predescu).		- assign reading text/chapter;	
1:00 – 4:00 *09.20.2018* *540 AAC*	**Lecture 8.** Protein Synthesis. (Dr. Tom Schmid)	Direct interaction of students with the lecturers and tutors	- assign reading text/chapter; - assign study guide for the	
1:00 – 4:00 *09.21.2018* *976 AAC*	Review for Midterm Exam		MIDTERM EXAM	
Week 4 *1:00 – 4:30* *09.24.2018* *540 AAC*	MIDTERM EXAM (Lectures 1-8)			**50 points**
1:00 – 4:00 *09.25.2018* *540 AAC*	**Lecture 9.** Epigenetics. Principles of epigenetics and epigenetic mechanisms. Epigenetic dysregulation in human disease. Epigenetic factors in gene regulation (Dr. Dan Predescu)	- provide information orally, supported by slides, , handouts and Panopto recording; - short interactions such as asking students to respond to a related questions; - small group activities/ assignments; - clinical correlations	- assign reading text/chapter;	
1:00 – 4:00 *09.27.2018* *540 AAC*	**Lecture 10.** Genetic mapping: quantitative genetics and linkage disequilibrium (Dr. Jitesh Pratap)		- assign reading text/chapter;	

Week 5 *1:00 – 4:00* *10.01.2018* *540 AAC* *1:00 – 4:00* *10.04.2018* *540 AAC*	**Lecture 11.** Approaches to mapping and identifying genetic susceptibility to complex diseases. Contribution of environment and epigenetic factors (Dr. Dan Predescu) **Quiz 3** **Lecture 12.** Genetics of cancer: evolution of cancer, oncogenes, tumor suppressor genes and chromosomal instability, signal transduction pathways Dr. Carl Maki)	- provide information orally, supported by slides, , handouts and Panopto recording; - short interactions such as asking students to respond to a related questions; - small group activities/ assignments; - case study/clinical correlations	- assign reading text/chapter;	**5 points**
Week 6 *1:00 – 4:00* *10.08.2018* *540 AAC* *1:00 – 4:00* *10.09.2018* *976 AAC* *1:00 – 4:00* *10.11.2018* *540 AAC*	**Lecture 13.** The molecular biology of apoptosis (Dr. Sanda Predescu) **Lecture 14.** Virus systems in molecular biology. Genetic tools to fight viral outbreaks (Dr. Dan Predescu) **Quiz 4** **Lecture 15.** Genetic tools to fight viral outbreaks (Dr. Dan Predescu)	- provide information orally, supported by slides, , handouts and Panopto recording; - short interactions such as asking students to respond to a related questions; - small group activities/ assignments; - case study/clinical correlations;	- assign reading text/chapter; - assign reading text/chapter;	**5 points**
Week 7 *1:00 – 4:00* *10.15.2018* *540 AAC* *1:00 – 4:30* *10.16.2018* *540 AAC*	Review/ Final Exam (lectures 9 -15) **FINAL EXAM** (Lectures 9 -15)	Direct interaction of students with the lecturers and tutors		**30 points**

Summary of Evaluation Methods of Student Performance
There will be **two exams** and **four quizzes** given during the course. The quizzes will include materials from 3-4 lectures. The first exam will include material from the first half of the course, and the second exam includes lectures from the latter part of the course. All quizzes and exams are taken in class, and review sessions will be given prior to the exams. Questions will be from lecture materials, reading assignments, and class discussions.

Grading Policies	
Course Grading Scale	Final course grades are determined using the allocation of credit for each assignment and exam listed within Course Content. The grading scale for the course is as follows: 85-100% A 70-84% B 55-69% C < 55% F
Timeframe for Reporting Grades	1 week
Assignment Submission	The assignments must be submitted on time as requested by the professor/lecturer.
Late Assignments	N/a
Late Exams	1 week
Attendance Expectations	Class attendance is important. Lecturers may emphasize in class certain segments of the lecture for better understanding, clarification and preparation for the exams. There will also be review sessions for additional preparations for the examinations.
Participation Expectations	The format of the class will require **reading that day's assignment BEFORE** coming to class. Each class will begin with time for specific questions related to the previous lecture material. Problem set assignments will be given at the end of each lecture and answers to these questions are required. If a topic is not covered in class, but is covered in the reading assignment, the student is responsible for it. Students having difficulty understanding the material may come and ask the lecturer or their tutor either after class or by appointment.

COURSE COMMUNICATION	
Course Communication	Blackboard, email, face-to-face discussions. The purpose of the discussion boards is to allow students to freely exchange ideas. While active and frequent participation is encouraged, cluttering a discussion board with inappropriate, irrelevant, or insignificant material will not earn additional points and may result in receiving less than full credit. Frequency is not unimportant, but content of the message is paramount. Please remember to cite all sources—when relevant—in order to avoid plagiarism.
Timeframe for faculty response to students	1 day
Expectations for professional	It is imperative to remain respectful of all viewpoints and positions and, when necessary, agree to respectfully disagree. Rush University students and faculty

behavior/ Netiquette	belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. Students will be held responsible for adhering to the policy on student academic honesty and conduct as stated in the RUCatalog. Academic dishonesty will result in sanctions imposed under the University's disciplinary system. Disciplinary actions range from warning, probation, suspension or expulsion from the University/Medical Center. Additional information on Academic Honesty and Conduct can be found at: https://www.rushu.rush.edu/catalog/acadresources/academichonesty.html

STRATEGIES FOR SUCCESS
Good attendance for each class and review sessions, reading that day's assignment BEFORE coming to class, active and frequent participation to the discussions.

RESOURCES and SUPPORT	
Resources for Technology Problems	If you need help with RULearning, call the RULearning Help line at (312) 563-CLAS, option 2. The RULearning help line is available 24/7/365. If you need help with access to your Rush computer account or software, call the Rush University Help desk at (312) 563-CLAS, option 4.
Counseling Center	The Rush University Counseling Center offers free, confidential services to all currently enrolled Rush University students. The Center is staffed by clinical psychologists who can help you address a wide range of issues. For more information regarding the Center and its services call (312) 942-3687. All students, including distance learners, have access to the Student Assistance Program at 1-800-292-2780.

UNIVERSITY POLICIES	
Academic Policies STANDARD	Students are responsible for following **all** Rush University policies and the policies that are specific to their college of admittance. Please refer to the Rush University Student Handbook and the relevant College Student Handbooks for more information. Selected policies are described below.
Disability Accommodations STANDARD	Rush University is committed to attracting and educating students who will help to make the health care profession representative of the national population, including individuals with disabilities. Part of Rush University's mission is to promote diversity among its student population and to provide equal access to its facilities, programs, services and learning opportunities. In keeping with this mission, the University encourages students with disabilities to engage the Office of Student Disability Services as soon as they begin their program. Students should contact **Marie Ferro-Lusk, Manager, Office of Student Disability Services** at Rush University, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings. Accommodations are not provided retroactively at the University. Additional information can be found online at the Office of Student Disability website or by contacting the Office of Student Disability Services. In order to respect students' privacy and ensure a thoughtful interactive discussion,

	students should not make accommodation requests to individual faculty members, lecturers, or course directors; instead, please contact: Marie Ferro-Lusk, MBA, MSW, LSW Manager, Office of Student Disability Services Phone: (312) 942-5237 Fax: (312) 942-2778 Email: Marie_S_Ferro-Lusk@rush.edu Website: https://www.rushu.rush.edu/students-disabilities
Honor Code and Academic Honesty	Students are expected to abide by the Rush Honor Code relating to academic integrity throughout all aspects of this course, including all assignments and exams. As trusted health care professionals, we take the issue of academic integrity very seriously and expect that you will adhere to the highest standards of integrity at all times. Rush University students and faculty belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. A partial list of academically dishonest behaviors that would subject a student to disciplinary action includes: • *Cheating*: Using unauthorized material or unauthorized help from another person in any work submitted for academic credit. • *Fabrication*: Inventing information or citations in an academic or clinical exercise. • *Facilitating Academic Dishonesty*: Providing unauthorized material or information to another person. • *Plagiarism*: Submitting the work of another person or persons, as one's own without acknowledging the correct source. • *Unauthorized Examination Behavior*: Conversing with another person, passing or receiving material to/from another person or temporarily leaving an examination site to visit an unauthorized site.
Intellectual Properties Protection	All materials contained within this syllabus, course and course materials, whether in written form or presented through video or audio transmission, represent the intellectual property of faculty or Rush University Medical Center. Students are prohibited from sharing or transmitting content or materials through any media without express consent or permission of the copyright holder.
Prohibition against Harassment, Discrimination, and Sexual Misconduct Policy	Click on link below to access the RUMC policy "Prohibition against Harassment, Discrimination, and Sexual Misconduct." The procedure for reporting harassment, discrimination, and/or sexual misconduct is found on p. 3. https://www.rushu.rush.edu/sites/default/files/_Rush%20PDFs%20and%20Files/sexual-harassment-policy-2014.pdf

RUSH UNIVERSITY

UNIVERSITY MISSION STATEMENT
Rush University provides outstanding health sciences education and conducts impactful research in a culture of inclusion, focused on the promotion and preservation of the health and well-being of our diverse communities.

Rush University Graduate College
Course Syllabus

Course Number	GCC 502
Course Title	Cellular Biochemistry: Protein, Transport, and Signaling
Course Code	WE
Credit Hours	3 semester hours
Clinical Practicum/Clerkship Hours	N/a
Term and Year	FA 2018
Location (in-class sessions)	540 AAC
Course Coordinator/Course Director(s) Name and Contact Information	Gabriella Cs-Szabo, Ph.D. Gabriella_Cs-Szabo@rush.edu 312.942.2255 Armour Academic Building, Suite 438 Office hours upon request
Additional Course Faculty Information	**Lecturers:** Dr. C. Forsyth Christopher_Forsyth@rush.edu Dr. T. Schmid Tom_Schmid@rush.edu Dr. S. Predescu Sanda_Predescu@rush.edu Dr. D. Morgan Deri_Morgan@rush.edu **Tutor:** Ricardo Perez Ricardo_Perez@rush.edu

Course Description	Concepts of cellular biochemistry, which underlie the structure, organization and communication of cells, will be presented. Protein, carbohydrate and lipid structure and function in cellular organization and their metabolism will be covered. Special emphasis will be placed on the roles of enzymes, signaling systems, receptors in cell function. Intermediary metabolism in health and disease will be discussed.
Course Objectives	Upon completion of the course, the student will be able to: 1. recognize that the function of a biomolecule is dependent on its structure. 2. describe the function of biomolecules in normal cellular, tissue, organ and systemic processes. 3. describe membrane-linked and intracellular processes that link the

	signal from the environment to the response of the cell. 4. demonstrate knowledge about cellular intermediary metabolic pathways and their regulations; and the interplay of pathways to generate energy and all necessary components for a living organism.
Prerequisites	N/a
Co-requisites	N/a
Required Textbooks	Molecular Cell Biology, 8th edition, 2016 by Lodish, Harvey; Berk, Arnold; Kaiser, Chris A. W. H. Freeman & Company, ISBN-13: 9781464183393
Recommended Textbooks	Optional readings for concepts - Lippincott's Illustrated Review of Biochemistry, 6th edition, 2014. Lippincott Williams & Wilkins, ISBN: 978-1-4511-7562-2.
Recommended Websites	N/a
EReserves Information	N/a
Required Equipment/ Uniform	N/a
Required Software/Online Tools	**My Apps:** https://myapps.rush.edu/ Students are recommended to use My Apps, which is a virtual desktop where Office software, Rush Email, and secure storage is provided. Visit https://rushuportal.learning.rush.edu/faq for more information about the My Apps virtual environment. Students are also able to log into RULearning from MyApps. **RULearning Login Page:** https://rulearning.rush.edu/ Students are also able to access RULearning via the listed login page. **Microsoft Office Suite: Word, Excel, and PowerPoint** If you do not already have the Microsoft Office software you can access the Suite through My Apps or download a copy of the Microsoft Office suite at a reduced cost for Windows or Mac users: https://rush.onthehub.com/ **Internet Browsers** Students should have access to more than one browser, such as Internet Explorer, Chrome, Firefox or Safari. All browsers should be the most up-to-date version available. **Adobe Acrobat Reader** Students should have access to the most up-to-date Adobe Acrobat Reader.
Internet Requirements	Students must have access to a high-speed internet connection when working off campus.

COURSE CONTENT				
DATES	**Content**	**Learning Activities***	**Assignments/ Assessments**	**% of Course Grade***
Week 1 10/18/19 1:00 p.m. – 4:00 p.m. 540 AAC	10/18/19 – Overview of the course Hierarchical structure of proteins (self-study) - G Cs-Szabo Lecture 1 Protein folding; Post-translational modifications and degradation of proteins. – T Schmid **Relationship to disease/Case Study**	Materials located in GCC 502 Course Book		
Week 2 10/22/19, 10/23/19 1:00 p.m. – 4:00 p.m. 540 AAC	10/22/19 – Lecture 2 Enzymes: Proteins as biocatalysts, kinetics and regulation; the role of hormones - T Schmid **Relationship to disease/Case Study** 10/23/19 - Overview of receptors and pathways Lecture 3 Receptors: families and subtypes; receptor-ligand interactions; receptor regulation Receptor integration, strategies for inhibition (include Ca2+) - C Forsyth	Materials located in GCC 502 Course Book		

Week 3 10/29/18, 10/30/18 1:00 p.m. – 4:00 p.m. 540 AAC	10/29/18 - **Quiz #1** Lecture 4 G-protein-coupled receptors: structure, activity, signaling events, effectors and regulation - C Forsyth **Relationship to disease/Case Study** 10/30/18 – Lecture 5 Cytokine receptors, receptor tyrosine kinases, MAP kinases, NF-κB - C Forsyth **Relationship to disease/Case Study**	Materials located in GCC 502 Course Book	Quiz covers material from Lectures 1 - 3	10%
Week 4 11/5/18, 11/6/18 1:00 p.m. – 4:00 p.m. 540 AAC	11/5/18 – Lecture 6 Digestion and absorption of food stuff; Generation of cellular energy; common pathways – G Cs-Szabo **Relationship to disease/Case Study** 11/6/18 – Lecture 7 Hormonal regulation of metabolism - D Morgan **Relationship to disease/Case Study**	Materials located in GCC 502 Course Book		
Week 5 11/12/18, 11/13/18 1:00 p.m. – 4:00 p.m. 540 AAC 11/15/18 1:00 – 4:30 p.m. **Midterm Exam**	11/12/18 – **Quiz #2** Lecture 8 Nuclear receptors – S Predescu **Relationship to disease/Case Study** 11/13/18 – Review **11/15/18 - Midterm Exam 1:00-4:30PM**	Materials located in GCC 502 Course Book	Quiz covers material from Lectures 4 – 6 Midterm Exam covers Lectures 1 - 8	10% 30%

540 AAC				
Week 7 11/27/18, 11/29/18 1:00 p.m. – 4:00 p.m. 540 AAC	11/27/18 – Lecture 9 Carbohydrates: Structure and Function, metabolism - G Cs-Szabo 11/29/18 – Lecture 10 Carbohydrate metabolism - G Cs-Szabo **Relationship to disease/Case Study**	Materials located in GCC 502 Course Book		
Week 8 12/3/18, 12/4/18 12/6/18 1:00 p.m. – 4:00 p.m. 540 AAC	12/3/18 - **Quiz #3** Lecture 11 Lipid classes and functions, lipid metabolism - G Cs-Szabo 12/4/18 – Lecture 12 Lipid metabolism/cholesterol – G Cs-Szabo **Relationship to disease/Case Study** 12/6/18 – Lecture 13 Amino acid metabolism, bioactive products - T Schmid **Relationship to disease/Case Study**	Materials located in GCC 502 Course Book	Quiz covers material from Lectures 9 – 10	10%
Week 9 12/10/18, 12/11/18, 12/13/18 1:00 p.m. – 4:00 p.m. 540 AAC	12/10/18 - **Quiz #4** Lecture 14 Integration of metabolism – G Cs-Szabo **Relationship to disease/Case Study** 12/11/18 - Summary Cases Review 12/13/18 – Review	Materials located in GCC 502 Course Book	Quiz covers material from Lectures 11 – 12 Final Exam covers material from Lectures 9 - 14	10% 30%

12/14/18 1:00 p.m. – 4:30 p.m. 540 AAC	**12/14/18 - Final Exam 1:00-4:30PM**			

Summary of Evaluation Methods of Student Performance

Grades will be based on cumulative performance on the two examinations (60%) and performance on written quizzes (40%).

Quiz #1	10%
Quiz #2	10%
Midterm Examination	30%
Quiz #3	10%
Quiz #4	10%
Final Examination	30%

Grading Policies

Course Grading Scale	Final course grades are determined using the allocation of credit for each assignment and exam listed within Course Content. The grading scale for the course is as follows: 85-100% A 70-84.9% B 55-69.9% C Under 55% F According to GCC guidelines, there is no make-up examination offered to raise the grade from B to A or from C to B. A grade of C should be balanced by grades of A on other courses. If a student fails GCC 502 with a grade of F, the student may be given a makeup examination covering the entire course material if permitted by the Course Director, institutional policies and mandates.
Timeframe for Reporting Grades	Grades are expected a week after assessment. Grades for the Final Exam can be expected by Friday, December 21, 2018.
Assignment Submission	N/a
Late Assignments	N/a
Late Exams	Students are expected to take all exams on the scheduled dates. Only under extenuating conditions would a student be allowed to take an exam on a date other than when it is scheduled. Any requests to take an exam on an alternative date must be given to the Course Director.
Attendance Expectations	Since lectures may clarify complicated points, attendance in class is highly recommended. Also, attendance at lectures will not only be helpful in giving logic to the instruction but also in understanding the most important points for testing. Since there will be several instructors, class attendance will allow you to better understand the information in the lecture handouts and the relative emphasis each instructor places on the information. The instructor may emphasize in class certain topics more than others and will help guide your preparation for testing.

	Lecturers will ask questions during the lectures and bring up problems for discussion. Consequently, active participation is required from the students. Some of these questions/problems will be in your handouts, thus you are encouraged to think about them before coming to class. Permission from the course director must be obtained in advance to take examinations or quizzes at times other than those scheduled. Permission will not be granted for other than exceptional circumstances such as a letter from a physician.
Participation Expectations	There will be 2 quizzes and 2 examinations during the course. Your testing will be from the lecture material, which contains the content of the handouts, and discussion during class. Thus, it is important for the student to attend class and take additional notes on the material covered during class. Questions for these tests will be graduate level essay questions requiring thinking and problem solving rather than just regurgitating basic knowledge. All examinations will be of the closed-book type; the use of any notes or books or prompting by others during examinations shall constitute unprofessional and unethical behavior and bears appropriate consequences.

COURSE COMMUNICATION	
Course Communication	It is recommended that e-mail be used as much as possible when students have questions about the course, since instructors do not have office hours. It is also recommended that students check their email for messages from the course director and faculty. If you wish to meet with the instructor, it is best to arrange appointments through e-mail. Your key-person in any matter is your Course Director. Please, feel free to contact Dr. Cs-Szabo with any matter that is related to your class work.
Timeframe for faculty response to students	24 hours
Expectations for professional behavior/ Netiquette	Peer-to-Peer and student-to-faculty communication is expected to be professional. Communication from the course director and teaching faculty will be through the GCCC 502 shell on Blackboard. Course materials including lecture slides will also be posted on Blackboard.

STRATEGIES FOR SUCCESS

- Read assigned chapters and/or the handout before coming to class.
- Attend every class period.
- Complete reading assignments.
- Complete self-study sections.
- Study for understanding of the concepts, not just memorization of "facts".
- Go over the lecture and reading assignments after class, and take extra notes from the reading.
- Consider studying with other students outside of class to discuss the material and prepare for quizzes and exams.

RESOURCES and SUPPORT	
Resources for Technology Problems	If you need help with RULearning, call the RULearning Help line at (312) 563-CLAS, option 2. The RULearning help line is available 24/7/365. If you need help with access to your Rush computer account or software, call the Rush University Help desk at (312) 563-CLAS, option 4.
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Honor Code and Academic Honesty	Students are expected to abide by the Rush Honor Code relating to academic integrity throughout all aspects of this course, including all assignments and exams. As trusted health care professionals, we take the issue of academic integrity very seriously and expect that you will adhere to the highest standards of integrity at all times. Rush University students and faculty belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. A partial

	list of academically dishonest behaviors that would subject a student to disciplinary action includes: • *Cheating*: Using unauthorized material or unauthorized help from another person in any work submitted for academic credit. • *Fabrication*: Inventing information or citations in an academic or clinical exercise. • *Facilitating Academic Dishonesty*: Providing unauthorized material or information to another person. • *Plagiarism*: Submitting the work of another person or persons, as one's own without acknowledging the correct source. • *Unauthorized Examination Behavior*: Conversing with another person, passing or receiving material to/from another person or temporarily leaving an examination site to visit an unauthorized site.
Intellectual Properties Protection	All materials contained within this syllabus, course and course materials, whether in written form or presented through video or audio transmission, represent the intellectual property of faculty or Rush University Medical Center. Students are prohibited from sharing or transmitting content or materials through any media without express consent or permission of the copyright holder.
Prohibition against Harassment, Discrimination, and Sexual Misconduct Policy	Click on link below to access the RUMC policy "Prohibition against Harassment, Discrimination, and Sexual Misconduct." The procedure for reporting harassment, discrimination, and/or sexual misconduct is found on p. 3. https://www.rushu.rush.edu/sites/default/files/_Rush%20PDFs%20and%20Files/sexual-harassment-policy-2014.pdf

RUSH UNIVERSITY

UNIVERSITY MISSION STATEMENT
Rush University provides outstanding health sciences education and conducts impactful research in a culture of inclusion, focused on the promotion and preservation of the health and well-being of our diverse communities.

Rush University Graduate College
Course Syllabus

Course Number	GCC 503
Course Title	Functional Cell Biology
Course Code	WE
Credit Hours	1 semester hour
Clinical Practicum/Clerkship Hours	N/a
Term and Year	FA 2018
Location (in-class sessions)	539 AAC, 540 AAC
Course Coordinator/Course Director(s) Name and Contact Information	Jitesh Pratap, PhD jitesh_pratap@rush.edu 312-942-4633 Jelke Building, Room 1409B Office Hours: 9:00 a.m. – 6:00 p.m.
Additional Course Faculty Information	**Teaching Faculties and Contacts** Dr. Kristin J Al-Ghoul Kristin_J_Al-Ghoul@rush.edu Dr. Sanda Predescu Sanda_Predescu@rush.edu Dr. Paul Carvey Paul_Carvey@rush.edu

Course Description	The major concepts of cell structure and function will be covered. Topics include tissue origin and organization, extracellular matrix, cytoskeleton, cell-cell adhesion, organelles and compartments, endocytosis, exocytosis, metabolic requirements for signal transduction, cell motility and regulation of cell proliferation.
Course Objectives	Within this course it is expected that the student will be able to attain the knowledge to demonstrate: • Compartments and organelles within the typical eukaryotic cell and the function • Introduction of Immune cell. • Cytoskeletal components and how they interact. • How cells are held together to form tissues (integrating cells into tissues). • The components of the extracellular matrix and how it interacts with cells. • The constituents of cells to allow them to communicate with each other and with the matrix around them. • Cell proliferation and apoptosis.

	• Cellular mitogenesis and cell cycle • Introduction to stem cells. • The mechanisms of cell motility, inflammation and metastasis. • How intracellular and extracellular components travel through cells. Membrane transport.
Prerequisites	N/a
Co-requisites	N/a
Required Textbooks	Instructed by Individual Teaching Faculty
Recommended Textbooks	The textbook for this course is *Molecular Cell Biology* (8th Edition) by Lodish, Berk, Kaiser, Krieger, Bretscher, Ploegh, Amon, Martin (2016).
Recommended Websites	Instructed by Individual Teaching Faculty
EReserves Information	N/a
Required Equipment/ Uniform	N/a
Required Software/Online Tools	**My Apps:** https://myapps.rush.edu/ Students are recommended to use My Apps, which is a virtual desktop where Office software, Rush Email, and secure storage is provided. Visit https://rushuportal.learning.rush.edu/faq for more information about the My Apps virtual environment. Students are also able to log into RULearning from MyApps. **RULearning Login Page:** https://rulearning.rush.edu/ Students are also able to access RULearning via the listed login page. **Microsoft Office Suite: Word, Excel, and PowerPoint** If you do not already have the Microsoft Office software you can access the Suite through My Apps or download a copy of the Microsoft Office suite at a reduced cost for Windows or Mac users: https://rush.onthehub.com/ **Internet Browsers** Students should have access to more than one browser, such as Internet Explorer, Chrome, Firefox or Safari. All browsers should be the most up-to-date version available. **Adobe Acrobat Reader** Students should have access to the most up-to-date Adobe Acrobat Reader.
Internet Requirements	Students must have access to a high-speed internet connection when working off campus.

COURSE CONTENT				
DATES	**Content**	**Learning Activities***	**Assignments/ Assessments**	**% of Course Grade***
Week 7 10/19/18 1-3pm 539 AAC	10/19/18 - Cellular Compartments and Function, Cell Signaling, Introduction of Immune Cell	***Lecture information: Oral presentation/slides and Panopto recordings; Lecture material handouts: Print copy and e-copy	Studying the lecture material and the text book chapter, Prepare for the quiz	
Week 8 10/25/18 1-3pm 539 AAC 10/26/18 1-3pm 539 AAC	10/25/18 - Introduction to the Cytoskeleton Cellular function and associated human diseases 10/26/18 - Introduction to the Extracellular Matrix and its clinical aspects	Lecture information: Oral presentation/slides and Panopto recordings; Lecture material handouts: Print copy and e-copy	Studying the lecture material and the book chapter, Prepare for the quiz	
Week 9 11/1/18 1-3pm 539 AAC 11/2/18 1-3pm 539 AAC	11/1/18 - Dynamics of Integrating Cells into Tissues: Cell-cell Adhesion, Gap Junctions, Cell-ECM adhesion, and its clinical aspect 11/2/18 - Cell cycle, Cell proliferation, Apoptosis	Lecture information: Oral presentation/slides and Panopto recordings; Lecture material handouts: Print copy and e-copy	Studying the lecture material and the book chapter, Prepare for the quiz	
Week 10 11/8/18 1-3pm 539 AAC 11/9/18 1-3pm 539 AAC	11/8/18 **- Quiz on material up to this point,** followed by lecture. Stem Cells: Principle and Clinical Application 11/9/18 - Cell Motility/ Inflammation/Metastasis	Lecture information: Oral presentation/slides and Panopto recordings; Lecture material handouts: Print copy and e-copy	Quiz Studying the lecture material and the book chapter, Prepare for the final exam	Quiz: 30%
Week 11 11/16/18 1-3pm	11/16/18 - Exocytosis and Membrane Fusion and Vesicular Traffic	Lecture information: Oral presentation/slides and Panopto recordings; Lecture	Studying the lecture material and the book chapter, Prepare for the final exam	

539 AAC		material handouts: Print copy and e-copy		
Week 12 11/19/18 1-3pm 540 AAC 11/20/18 1-3pm 540 AAC	11/19/18 - Membrane Transport (Carrier proteins and active membrane transport, ion channels and electrical properties of membranes) 11/20/18 - Review	Lecture information: Oral presentation/slides and Panopto recordings; Lecture material handouts: Print copy and e-copy	Studying the lecture material and the book chapter, Prepare for the final exam	
Week 13 11/26/18 1-4pm 540 AAC	11/26/18 - **EXAM**		Final Exam	Final Exam: 70%

Summary of Evaluation Methods of Student Performance
There are 2 exams in this course: Quiz and the Final Examination. The exam question format will include multiple-choice or true/false for Quiz and short answer or essay types of questions for the final exam. Students will have three hours (1:00 to 4:00 PM) to complete the exams.

Grading Policies	
Course Grading Scale	Final course grades are determined using the allocation of credit for each assignment and exam listed within Course Content. The grading scale for the course is as follows: Grades will be determined from the score of the Quiz (30%) described below and of the Final Examination (70%). Quiz will be administered at the beginning of the session on November 9th at 1:00 pm. It will consist of multiple choice and True/False, and will be counted for 30% of the final grade. The Final Examination may be a combination of the following: Essay Short answer The final exam will contribute 70% to the final grade. The grading scale for the course is as follows: 85 – 100 = A 70 – 84.9 = B 55 – 69.9 = C Below 55 = F
Timeframe for Reporting Grades	2-4 weeks
Assignment Submission	N/a
Late Assignments	N/a
Late Exams	According to GCC guidelines, there is no make-up examination offered to raise the grade from B to A or from C to B. If a student fails GCC 503 with a grad of F, the student may be given a makeup examination covering the entire course material if permitted by the Dean of the College, institutional policies and mandates. NOTE: To do well in this course, it is advised that the student attend lectures and read the assigned text book when a topic is not well understood by the student. A strong knowledge of the class notes is imperative.
Attendance Expectations	Attendance at lecture is not mandatory, however, if the student is not present at lecture that student must follow the lecture notes on his/her own. Attendance at the Quiz and Examination is mandatory. There will be no make-up examinations. If a student is ill on the day of the examination and must miss the quiz/examination, a physician's letter (on letterhead and with the physicians contact information) is required for a replacement examination to be taken. The

	replacement examination will not be the same examination that the class took and will consist entirely of essay questions. This replacement examination must be taken sometime prior to the end of the next quarter.
Participation Expectations	Discussion of the course content during the lectures.

COURSE COMMUNICATION	
Course Communication	We encourage students to contact faculty with any questions about the course, the content, the assignments (if any), or the exams. Please use the course Discussion Board to ask questions about the course content or assignments. These questions and their answers help everyone better understand the content and help create a learning community. However, please feel free to contact us privately by email if you have questions of a personal nature or need to speak with us privately. **COURSE DIRECTOR:** Dr. Jitesh Pratap (Jelke Building, Room 1409B, 312-563-4633, jitesh_pratap@rush.edu) **Teaching Faculties and Contacts** Dr. Kristin J Al-Ghoul Kristin_J_Al-Ghoul@rush.edu Dr. Sanda Predescu Sanda_Predescu@rush.edu Dr. Paul Carvey Paul_Carvey@rush.edu
Timeframe for faculty response to students	Questions posted in the course on weekdays, will usually be answered within 24 hours. Questions posted in the course on the weekend, will usually be answered within 48 hours.
Expectations for professional behavior/ Netiquette	All students are expected to: 1. Show respect for other students and the instructors in the class. 2. Be sensitive to the fact that there will be cultural and linguistic backgrounds, as well as different political and religious beliefs. 3. Express differences of opinion in a polite and rational way. 4. Maintain an environment of constructive criticism when commenting on the work of other students or the course. 5. Respect the privacy of other students. 6. Use good grammar and spelling. 7. Use salutations and titles in your messages. Formal titles (Dear Dr. Smith, Dear Professor, Dear Classmates) are always acceptable. It is also appropriate to end you note with a closing, with a closing (Thank you, Sincerely, Respectfully) when emailing students or faculty. 8. Be sure to say please and thank you. 9. Send only one message about a topic and wait for an answer. 10. Write your messages in formal language using sentences, capitalization, punctuation, and appropriate grammar.

STRATEGIES FOR SUCCESS

Below are some strategies that will help you be successful in this course.

- Print the course syllabus and schedule. Post the course schedule in your study space and put the due dates in your personal calendar. Check the schedule at least once a week to make sure that you know what is due that week.
- Use the course calendar in BlackBoard. You can integrate the calendars from all of your classes into a single calendar. You can also 'push' the course calendar into your personal calendar on your phone or digital tablet.
- Be sure to check the course at least 3 times a week. Each time, check the Discussion Board, Course Email, and Course Calendar.
- Print the weekly modules. Focus your studying on the learning objectives listed in the modules. These objectives specify what knowledge and skills must be learned that week, and the assignments and exam questions are based on those objectives. When you study for the exams, make sure that you can answer each of the objectives and state the answer out loud.
- Once the assignments are graded, you can review the correct answers and any instructor comments
- Attend the online classes or watch the mp4 recordings of the classes. The recordings are usually available about 24 hours after the live class. A printable version of the PowerPoint slides used in the class will be provided before the class starts.
- Use the course discussion board to ask questions related to the course content and assignments.
- Use the course email for personal questions. The course email system is located in the BlackBoard course.
- Contact the course director as soon as possible if you are having difficulties with the course or personal issues that may affect your performance in the course.
- Keep up with the course. If you follow the instructions for each week of the course, you will find that you are ready for the assignments and exams, course calendar, and the weekly modules.
- When completing your assignments, please write your answers in complete sentences using appropriate grammar, spelling, and punctuation.
- Complete your assignments and submit them before the deadline. The due dates for all assignments are listed in the course syllabus. Assignments are always due by 11 pm Central Time. Late assignments receive a 20% deduction in points.
- Exams must be completed and submitted by the deadline for submission. Late exams cannot be accepted.

Finally, in all situations, please adhere to the Rush Honor Code. This is an essential part of your personal and professional integrity.

RESOURCES and SUPPORT

Resources for Technology Problems	If you need help with RULearning, call the RULearning Help line at (312) 563-CLAS, option 2. The RULearning help line is available 24/7/365. If you need help with access to your Rush computer account or software, call the

	Rush University Help desk at (312) 563-CLAS, option 4.
Counseling Center	The Rush University Counseling Center offers free, confidential services to all currently enrolled Rush University students. The Center is staffed by clinical psychologists who can help you address a wide range of issues. For more information regarding the Center and its services call (312) 942-3687. All students, including distance learners, have access to the Student Assistance Program at 1-800-292-2780.

UNIVERSITY POLICIES	
Academic Policies STANDARD	Students are responsible for following **all** Rush University policies and the policies that are specific to their college of admittance. Please refer to the Rush University Student Handbook and the relevant College Student Handbooks for more information. Selected policies are described below.
Disability Accommodations STANDARD	Rush University is committed to attracting and educating students who will help to make the health care profession representative of the national population, including individuals with disabilities. Part of Rush University's mission is to promote diversity among its student population and to provide equal access to its facilities, programs, services and learning opportunities. In keeping with this mission, the University encourages students with disabilities to engage the Office of Student Disability Services as soon as they begin their program. Students should contact **Marie Ferro-Lusk, Manager, Office of Student Disability Services** at Rush University, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings. Accommodations are not provided retroactively at the University. Additional information can be found online at the Office of Student Disability website or by contacting the Office of Student Disability Services. In order to respect students' privacy and ensure a thoughtful interactive discussion, students should not make accommodation requests to individual faculty members, lecturers, or course directors; instead, please contact: Marie Ferro-Lusk, MBA, MSW, LSW Manager, Office of Student Disability Services Phone: (312) 942-5237 Fax: (312) 942-2778 Email: Marie_S_Ferro-Lusk@rush.edu Website: https://www.rushu.rush.edu/students-disabilities
Honor Code and Academic Honesty	Students are expected to abide by the Rush Honor Code relating to academic integrity throughout all aspects of this course, including all assignments and exams. As trusted health care professionals, we take the issue of academic integrity very seriously and expect that you will adhere to the highest standards of integrity at all times. Rush University students and faculty belong to an academic community with high scholarly standards. As essential as academic honesty is to the relationship of trust fundamental to the educational process, academic dishonesty violates one of the most basic ethical principles of an academic community, and will result in sanctions imposed under the University's disciplinary system. A partial list of academically dishonest behaviors that would subject a student to disciplinary action includes: • *Cheating*: Using unauthorized material or unauthorized help from another person in any work submitted for academic credit. • *Fabrication*: Inventing information or citations in an academic or clinical

	exercise. • *Facilitating Academic Dishonesty*: Providing unauthorized material or information to another person. • *Plagiarism*: Submitting the work of another person or persons, as one's own without acknowledging the correct source. • *Unauthorized Examination Behavior*: Conversing with another person, passing or receiving material to/from another person or temporarily leaving an examination site to visit an unauthorized site.
Intellectual Properties Protection	All materials contained within this syllabus, course and course materials, whether in written form or presented through video or audio transmission, represent the intellectual property of faculty or Rush University Medical Center. Students are prohibited from sharing or transmitting content or materials through any media without express consent or permission of the copyright holder.
Prohibition against Harassment, Discrimination, and Sexual Misconduct Policy	Click on link below to access the RUMC policy "Prohibition against Harassment, Discrimination, and Sexual Misconduct." The procedure for reporting harassment, discrimination, and/or sexual misconduct is found on p. 3. https://www.rushu.rush.edu/sites/default/files/_Rush%20PDFs%20and%20Files/sexual-harassment-policy-2014.pdf

Appendix: Excerpts from the Rush University Catalog:

The University Catalog specifies the rules that govern the Graduate College and its Programs. Each Program may have additional policies and procedures providing that they do not conflict with those specified in the Catalog.

As a service to students and faculty, the Academic Policies, Academic Standing and Appeal sections of the Catalog have been reprinted in this Appendix. Please Note: Since the University Catalog for the current year is not available until the start of classes, the excerpts given here are from last year's Catalog. Please check the website http://www.rushu.rush.edu/catalog/ for the current Catalog.

You are governed by the policies in effect at the time you entered Rush Univ. A copy of the Catalog for each academic year is kept on line in a PDF file. A change in the policies can be made provided you are notified in writing or by email.

The Graduate College: Academic Policies:

The Graduate College adopts college-wide policies and procedures and reviews division regulations. Students follow the college and division policies in effect at the time of initial matriculation in The Graduate College. However, The Graduate College reserves the right to make substantive changes in its programs after the student's matriculation. Students will be informed in writing by the division director of any changes made during their tenure in the program. Students re-entering the college after an absence will be guided by policies and procedures in effect at the time of re-entry.

Examination Policy:

Re-enforcing the examination policy of the college is the responsibility of the individual course director, who will inform students and the proctors about the examination requirements for that particular course. A period at the end of the semester is provided for examinations; however, any form of assessment can be conducted at any week of the semester. This information will be included in the course schedule and syllabus.

Pass/No Pass Grading Option

Each program identifies all courses required of its students. Required courses are usually taken for letter grade and not under the pass/no pass (P/N) option. Research hours are generally graded using the P/N option. However, a program may opt to provide a letter grade for research classes. The grading policy for post-candidacy research hours (over 600) for doctoral students is graded as P/N.

Good Academic Standing:

To remain in good academic standing, students must maintain a cumulative grade point average of 3.0 and meet the requirements of his/her division. A student must be in good

academic standing to be admitted to candidacy and to graduate. Students failing to maintain a GPA of 3.0 will be notified by the Dean in writing of a change in their status to probationary status. Any student who fails to remediate this deficiency within one academic year or is placed on probationary status a third time is subject to dismissal by The Graduate College.

Academic Difficulty:

Each program has policies and procedures regarding students who fail to maintain good academic standing. While the responsibilities of informing students of their academic problems and of establishing conditions for regaining good academic standing reside within the program, The the Graduate College Council monitors the progress and promotion of all students and gives final approval to award students' degrees.

Dismissal:

Each program establishes grounds for dismissal beyond the minimal criteria established by The Graduate College. Should a program recommend the dismissal of a student, the director will forward such recommendation to The Graduate College Council for final action. Letters of dismissal come from the Dean. Appeal of a dismissal action begins within the appropriate program.

Full-time Enrollment:

Full-time enrollment is required of all Graduate College students with the exception of the clinical research students and students within the PhD programs in nursing science and health sciences. Full-time students must register for at least nine semester hours for each term, except when advised differently. Students must obtain written permission from the program director for exceptions to this policy. Students receiving a thesis-requiring master's degree from The Graduate College as a full-time student must be enrolled for all terms between their matriculation and graduation. The average length of this program is five semesters. Part-time students earning a master's degree must be enrolled a minimum of two semesters per academic year. The accelerated, non-thesis master's program's length is two semesters. The minimum requirement for graduation from the college is program specific. At the time of graduation, the student must be enrolled in the College. The maximum time allowed to graduate from a full-time thesis-requiring master's degree program is four years starting the first semester of official enrollment and for the PhD degree is five years.

Residency:

Doctor of Philosophy (PhD) candidates are expected to meet all requirements for graduation within five enrolled academic years in The Graduate College (excluding leaves of absence [see below]). This period begins with the semester in which the student formally matriculates. A student exceeding that time limitation must submit to the graduate council, in writing, a request to extend their candidacy beyond that time period. This request must identify the reasons for the extension and provide a written plan with reasonable deadlines for completion. This document will be co-signed by the student's advisor and program director. The council will then vote whether to accept the extension or not (passed by simple majority). The student's advisor will then provide an update on the student's progress after six months. One year after the extension is granted, the

student is expected to complete all requirements. A second request may be made by the student's advisor and program director, but will be accepted only through a two-thirds majority of the voting members present at a formal hearing of the Graduate College Council. Within one year of that second request, the student must complete all requirements for the PhD degree or face dismissal. Alternatively, the student may be awarded a MS degree upon the recommendation of the student's graduate program.

Readmission:

Any student who has withdrawn from the University or any dismissed student may apply for readmission by submitting an application for this purpose to the College Admission Office. An interview may be required. A re-entering student must meet the conditions for re-enrollment stated in his/her dismissal or re-entry acceptance letter and all policies, requirements and course sequence in effect at the time of re-entry. The student will pay tuition and fees at the rates in effect at the time of re-enrollment. Application deadlines may vary by division.

Academic Progression:

The graduate program in concert with the rules of the College and Rush University develop specific regulations governing the process that results in final awarding of the degree. While such regulations differ slightly from one program to another, The Graduate College Council reviews each regulation for approval. Programs are required to be explicit and clear about regulations that will affect the candidate. This must be stringently observed in program regulations concerning selection of principal advisors, advisory committees, and a plan of study. Similarly, divisions will be explicit and clear concerning academic policies and procedures surrounding qualifying, preliminary, and final examinations when they are required. The programs are also responsible for providing the candidate with the support needed to plan and conduct the dissertation research. At the same time, a major responsibility of the student is to become familiar with the regulations and expectations of his/her chosen program. These regulations and expectations are included in the University Catalog within the sections devoted to each divisional program and are also included within program publications. The student is responsible for understanding the regulations and monitoring changes that may occur during their tenure in the program.

Student Academic Appeals Policy:

Any student of The Graduate College may appeal a final course grade, failure on a preliminary or comprehensive examination, or failure of the thesis or dissertation that results in his or her academic probation or dismissal from the University. A student may also appeal an unreasonable delay in his or her graduation from the University. No other issues may be appealed through this process.

The process for filing an appeal is maintained by each program. The student may request a copy of the program appeal process from the program director. This process will be completed within one semester. If a resolution cannot be achieved at the Division level, the following procedure must be followed. At any step in the process, the student may withdraw the appeal by written notification to the program director with a copy to the

Dean. In the event of a dismissal decision, a student may continue to enroll until the appeal process is completed or the student withdraws the appeal.

Step 1: If the student wishes to appeal the decision beyond the program, within two weeks of receiving a decision from the program, the student will submit a written statement to the Dean requesting consideration of his or her case by an advisory panel. The student must provide the following in the written statement.

- Course number and grade being appealed or other cause for probation or dismissal, i.e., failure of preliminary or comprehensive examination, or thesis or dissertation
- Action being requested
- Justification for the request
- An outline of the efforts and actions already taken to obtain consideration of the request

The student will send copies of this communication to the program director and the Dean's office. In addition, if a course grade is being appealed, the student will send a copy to the course director. If the evaluation of a thesis or dissertation is being appealed, the student will send a copy to the chairperson of the thesis or dissertation committee. The advisory panel will be the Graduate College Council. Its chairperson will be appointed by the Dean from among the members. The program director of the student's program and any other member who is evaluating the student's academic status will not vote.

Step 2: Within two weeks after notification to the Dean, the Chairperson of the Advisory Panel will arrange a meeting of the Advisory Panel. It will submit a written recommendation to the Dean.

Step 3: Within two weeks following receipt of the advisory panel's recommendation and upon discussion with the student and with others as appropriate, the Dean shall reach a final decision and notify each party of the decision. The decision reached by the Dean is final.

The issues discussed and the outcomes of all meetings in this appeal process are documented. This record-keeping is the responsibility of a faculty member who is to be designated at each meeting. Copies of the documentation should be distributed to the individuals present at a meeting, to the program director, the Dean and to the student's academic file.

Rush University Academic Policies

The Academic Resources and Policies section of this catalog contains additional Rush University academic policies.

This Rush University catalog also details the policies regarding inclusion of minorities and those with disabilities, as well as the policies and procedures for reporting

harassment. Students who may need special accommodations can access this information at https://www.rushu.rush.edu/students-disabilities.

Academic Honesty and Student Conduct

The Graduate College and its programs follow the University policies on academic honesty and the University statement on student conduct. Each student is expected to conduct himself or herself at all times in a professional manner - a manner which conforms to the ethics of the profession, and which instills confidence in one's abilities as a working scientist. Irresponsible, unprofessional or unethical behavior, as determined by the Graduate Honor Code Committee may results in dismissal from the program.

The College and its programs will not condone cheating in any form. Allegations of cheating will be reviewed by the program director with the help of an ad hoc committee. If merited, the report will be forwarded to the Graduate College Honor Code Committee.

Diversity, Equal Opportunity, Affirmative Action:

For over three decades, the Rush approach to equal opportunity and diversity has not wavered. It is that equal opportunity and diversity in employment, education, and the delivery of health care are essential and must be furthered. This is a continuation of a policy that emanated from the Hospital Charters of 1865 and 1883 and the documents governing the establishment of Rush University in 1972.

In certain instances, the implementation of these policies requires the use of affirmative action initiatives. At Rush these are focused on strong recruitment and programming efforts, not on the use of quotas - and these recruitment and programming efforts will be continued, consistent with federal, state, and municipal guidelines.

In keeping with its goal of promoting diversity through its equal opportunity and affirmative action programs, Rush University is committed to attracting students who will enable the student body to achieve the educational benefits of diversity, and to provide services to all students, faculty, and other employees on a nondiscriminatory, equitable basis. Discrimination or harassment against any member of the Rush University Medical Center community because of race, color, gender, sexual orientation, religion, national origin, ancestry, age, marital status or parental status, disability as defined by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, or any other category protected by federal or state law is prohibited and will not be tolerated, nor will any person for those reasons be excluded from participation or denied the benefits of any program or activity within Rush University. Paula J. Brown, Manager of Diversity and Inclusion, has been designated to oversee the implementation of this policy and can be reached by telephone at (312) 942-7094, by mail (Suite 128, Professional Building), or via e-mail at Paula_J_Brown@rush.edu.