EINSTEIN
Albert Einstein College of Medicine

Graduate Programs in the Biomedical Sciences

COURSE CATALOG

Fall 2023 Block I

Fall 2023 Courses

Block I

Subject to change

BIOS 7001 – Biochemistry

COURSE LEADER:
Jonathan R. Lai, PhD

COURSE SCHEDULE:
August 14 – November 9, 2023
Mondays, Wednesdays, Fridays, 9:00-9:50; Tuesdays, Thursdays, 9:00-10:50

COURSE DESCRIPTION:
This is an introduction to fundamental topics in biochemistry and physical biochemistry. Topics include: protein structure, folding, and function, nucleic acid structure and protein-DNA interactions, enzymology, energetics & allostery, posttranslational modification of protein function, transcription, translation, and DNA replication. The material is presented in formal lectures in conjunction with a protein/nucleic acid structure-based tutorial.

COURSE OBJECTIVES:
The goal of this course is to educate students on the fundamentals of biochemistry including protein and nucleic acid structure, enzymology, and DNA replication, transcription, and translation. In addition, students will learn how to interpret and manipulate protein and nucleic acid structures.

PREREQUISITES:
One semester of undergraduate biochemistry and a course in organic chemistry are required. Undergraduate physical chemistry is also helpful preparation. Students who are uncertain about the adequacy of their undergraduate training for this course should discuss the issue with their advisory committee and then consult the course leader. Students should be familiar with the general principles of biochemistry including basic knowledge of amino acid and nucleic acid structure. They should also be familiar with general principles such as DNA replication, transcription and translation. All students who want to register for Graduate Biochemistry must complete the assessment exam during Orientation Week.

REQUIRED MATERIALS:
Biochemistry, 4th Edition, D. Voet and J. G. Voet. ISBN 978-0470570951

SUITABLE FOR 1ST YEAR STUDENTS:
Yes.

STUDENT ASSESSMENTS:
There are three closed-book exams (2 hours each) administered throughout the Block worth 30% each. In addition, 10% of the grade will be based on tutorials for nucleic acid/protein structure.

CREDIT HOURS: 5.0

BIOS 8012 – Health Technology Innovation Biodesign

COURSE LEADER:
Sunit Jariwala, MD

COURSE SCHEDULE:
October 11 – November 3, 2023
Wednesdays, Fridays, 9:00-9:50

COURSE DESCRIPTION:
Health technologies such as therapeutics, medical devices, and digital tools have great potential to transform the delivery of healthcare and encourage personalized medicine. This 4-week elective course aims to provide students with an understanding of needs-based innovation biodesign, prototype development and validation, and sustainability through entrepreneurship.

Elective participants will pair in teams of 2-3 individuals per team. Team members will work together to complete cases, conceptualize an innovation project, and present an end-of-elective presentation regarding this project. This 4-week elective will give trainees an entrepreneurial-focused perspective regarding the 'journey' of commercially viable health technology solutions. The elective will consist of Zoom-based small group sessions (case discussions, topical presentations by experts in the innovation biodesign arena) and didactics (required articles, cases, videos, podcasts).

COURSE OBJECTIVES:
1. Students will demonstrate an understanding of the innovation biodesign process and the importance of health technology innovation, as assessed by: 1) Trainees' completion of assigned articles, cases, and an innovation project; and 2) Trainees' feedback/survey and exit interview responses.
2. Students will demonstrate an understanding of conducting the needs-based innovation process, market assessments, competitive landscape analyses, and SWOT analyses.
3. Students will prepare for and present an end-of-elective pitch presentation.

PREREQUISITES:
None.

REQUIRED MATERIALS:
Computer with an internet browser for accessing the assignments and participating in the virtual class sessions.

SUITABLE FOR 1ST YEAR STUDENTS:
No.

STUDENT ASSESSMENTS:
Three articles and cases will be discussed in each discussion session. Each team will present a case and article summary and will be constructively critiqued by the other students. Each 20-30-minute presentation will be PowerPoint-based and will be followed by an interactive discussion by the entire group of elective participants. Grades will be based on an understanding of the articles and cases as demonstrated by the clarity of presentations and quality (i.e. thoughtful contributions and questions and answers) of discussion.

Students will be expected to attend and participate (i.e. present, contribute to the discussion when not presenting) in all sessions. Those missing a session will need to review the session recording within 1 week of the session and submit a 1-page summary of the articles and cases assigned for that missed session.

Final Grade:
60%: Completing and demonstrating an understanding of the articles and cases, as demonstrated by thoughtful presentations and discussions during the sessions.
40%: Final presentation – grade will be based on the quality of the presentation slides and presentation delivery and adequately answering questions from elective participants and the course leader(s)

The final grade (Honors, Pass, Fail) will consist of student contributions aggregated among the sessions and will be submitted by the course leader(s) following the end of the course. A grade of honors can be achieved if students exceed the course expectations, for example, by identifying additional articles related to the discussion topic. Students will receive a grade of fail if they do not adequately present the cases or articles or final presentation and if they do not meaningfully participate in the interactive discussions.

CREDIT HOURS: 0.5

BIOS 7037 – Introduction to the Mathematics of Theoretical Systems Biology

COURSE LEADER:
Aviv Bergman, PhD | Yehonatan Sella, PhD

COURSE SCHEDULE:
August 15 – November 9, 2023
Tuesdays, Thursdays, 1:10-2:30

COURSE DESCRIPTION:
An introduction to the mathematical topics necessary to conduct theoretical and computational systems biology. Topics covered are stochastic processes, dynamical systems, modeling using ODEs and PDEs, and the basics of machine learning. Lecture-based learning with office hours discussion.

COURSE OBJECTIVES:
To equip students with the tools required to model and analyze computational models of biological systems, and provide them with the basic knowledge to understand and feel more fluent in the underlying mathematics.

PREREQUISITES:
Calculus, Linear Algebra, Basic Probability Theory.

REQUIRED MATERIALS:
Computer with MATLAB and R.

SUITABLE FOR 1ST YEAR STUDENTS:
Yes.

STUDENT ASSESSMENTS:
10% participation, 20% homework, 30% midterm, 40% final. A grade above 60 required to pass. Feedback regarding grades will be regularly provided during the course.

CREDIT HOURS: 3.0

BIOS 7036 – Mechanisms in Cancer Biology

COURSE LEADER:
Kamini Singh, PhD | Jonathan Backer, MD | Eugen Dhimolea, PhD | Praveen Agrawal, PhD

COURSE SCHEDULE:
August 22 – November 14, 2023
Tuesdays, Thursdays, 2:20-3:40

COURSE DESCRIPTION:
This course will provide an in-depth understanding of the fundamental mechanisms involved in cancer biology. A key component of this course is a detailed examination of the molecular and cellular signaling processes that lead to the initiation and progression of cancer. The course will also cover topics such as genetic and epigenetic changes, the role of oncogenes and tumor suppressor genes, the impact of the tumor microenvironment on cancer progression, and the mechanisms of metastasis. The course will discuss the latest research and techniques used to study cancer biology, including genomics, proteomics, and bioinformatics. While cancer therapeutics is not a major focus, students will be exposed to current immunotherapy and targeted therapeutics research. Through didactic lectures and team-based learning exercises, students will critically evaluate the latest research literature on cancer signaling and mechanisms. Upon completion of the course, students should be equipped with a solid foundation in the mechanisms and pathways involved in cancer signaling, and the skills and knowledge necessary to apply this understanding to critically evaluate and design experiments in cancer research.

COURSE OBJECTIVES:
The objectives of this course would typically include:

1. Provide a detailed examination of signaling pathways involved in cancer initiation, progression, and metastasis through didactic lectures.
2. Understand the role of oncogenes and tumor suppressors in cancer development.
3. Define how changes in DNA repair processes, stem cells and intermediate metabolism promote cancer initiation and progression.
4. Explore the molecular mechanisms underlying tumor metastasis and its regulation by the tumor microenvironment.
5. Critically evaluate and interpret the latest research literature in cancer signaling and mechanisms through team-based learning discussions and peer review exercises.

Expected outcome:
The expected outcome of this course would be a comprehensive understanding of the signaling pathways and molecular mechanisms involved in cancer biology, including how these pathways contribute to cancer initiation, progression, and metastasis. Students would gain knowledge about the interplay between genetic, epigenetic, and signaling factors that drive cancer development, as well as the latest advances in cancer research and therapeutic approaches. Upon completion of the course, students should be equipped with the skills and

knowledge necessary to critically evaluate and design experiments aimed at unraveling the complexities of cancer signaling and mechanisms.

PREREQUISITES:
Undergraduate course in Molecular Biology at the level of Alberts "Molecular Biology of the Cell".

Students should be familiar with college-level molecular biology, cell biology, and basic knowledge of gene structure and cancer.

REQUIRED MATERIALS:
Computer.

Recommended readings (not required):

- The Biology of Cancer 3rd Edition 2023 by Robert Weinberg. ISBN-13: 978-0393887655
- The Biology of Cancer, Third Edition Ebook, Interactive Online Textbook
- Cell Signaling: Principles and mechanisms 2014 by Lim, Mayer and Pawson. ISBN-13: 978-0815342441
- The Emperor of All Maladies: A Biology of Cancer by Siddhartha Mukherjee (ISBN-13: 978-1439170915)
- Molecular Cell Biology, Lodish et al. ISBN-13: 978-0716776017

SUITABLE FOR 1ST YEAR STUDENTS:
Yes

STUDENT ASSESSMENTS:
10% participation in TBL exercises; 30% each of three exams.

Exams: There will be three exams to access students' understanding of key concepts and their ability to apply their knowledge to solve problems related to cancer biology.
Team-based learning exercises: These exercises, which are incorporated throughout the course, will assess students' ability to work collaboratively and effectively as part of a team.

CREDIT HOURS: 3.0

BIOS 7006 – Molecular Genetics

COURSE LEADER:
Nicholas E. Baker, PhD

COURSE SCHEDULE:
August 14 – November 10, 2023
Mondays, Wednesdays, Fridays, 11:00-11:50; Tuesdays, Thursdays, 2:30-3:50

COURSE DESCRIPTION:
The course is designed to convey genetic concepts and their application in a diverse set of model systems. It will allow students to understand and critically evaluate the literature. The course is divided in to three sections. In the first section, students will briefly review basic genetic concepts. This part is followed by a discussion of yeast and bacteria as genetic models and their use in high throughput and classical biochemical approaches. In the second section, students will learn about the major vertebrate systems, including human genetics, mouse genetics, and zebra fish genetics. The third section is dedicated to invertebrate genetics (including worms and flies) as well as to a discussion of special aspects of cancer genetics. Overall, this course should convey graduate level genetics in all its modern facets and constitute the foundation for more advanced studies.

COURSE OBJECTIVES:
A comprehensive syllabus includes a brief introduction and an overview of all major model organisms currently in use for research. The goal of this course is to provide an overview over modern genetic methods and approaches using both classic and modern examples and to convey the possibilities and contributions of the field of Genetics to the understanding of biological processes.

PREREQUISITES:
Undergraduate genetics is required.

REQUIRED MATERIALS:
Computer.

SUITABLE FOR 1ST YEAR STUDENTS:
Yes.

STUDENT ASSESSMENTS:
Passing grade is usually 60%. There are exams after each section of the course. The first and second exam count for 30% each and the third exam for 40%.

CREDIT HOURS: 5.0

BIOS 5015 – MSTP Pharmacology-Physiology-Pathology

COURSE LEADER:
Myles Akabas, MD, PhD

COURSE SCHEDULE:
August 14 – September 19, 2023
Monday – Friday, Days and Time variable

COURSE DESCRIPTION:
This course will material included in the medical school MCFM-2A module at a more scientifically rigorous level. The MCFM-2A module includes content in pharmacology, physiology, and pathology. The pharmacology section of the course will focus on pharmacokinetics, pharmacodynamics, exemplar drug classes, and drug development. The physiology section will focus on the molecular and cellular basis of muscle contraction comparing the contractile processes and regulation of contractile strength in skeletal, smooth, and cardiac muscle. The pathology section will cover three topics, 1) cell injury and death, 2) cell repair and adaptation, and 3) aging.

COURSE OBJECTIVES:
The course has three major objectives.

1) Students should understand the processes of drug absorption, distribution, metabolism, and excretion and the general approaches to drug development.
2) Students should understand the mechanisms of contraction and the, control and regulation of muscle contraction in smooth, skeletal, and cardiac muscle.
3) Students should understand the cellular responses to injury, repair, cell death, and the effects of aging on cellular processes.

PREREQUISITES:
One year of undergraduate physics, biology, chemistry, organic chemistry/biochemistry, and mathematics. Completion of the MSTP Physiology: Membranes & Transport course.

REQUIRED MATERIALS:
Chapters from relevant textbooks and journal articles will be provided via the Canvas course website.

SUITABLE FOR 1ST YEAR STUDENTS:
Yes. Required for 1st year MSTP students.

STUDENT ASSESSMENTS:
There will be three assessments, one for each section of the course. They will be completed as open book quizzes, followed by in class small group discussions of the problems, and then discussion of the answers by the entire class. Each assessment will be worth 30% of the grade, and students will get 10% based on class participation. Passing will be based on demonstration of understanding the material covered in the course.

CREDIT HOURS: 1.0

BIOS 7406 – Principles of Neuroscience I

COURSE LEADER:
Bryen A. Jordan, PhD | Alberto E. Pereda, MD, PhD

COURSE SCHEDULE:
August 22 – November 10, 2023
Tuesdays, Thursdays, Fridays, 2:00-4:00

COURSE DESCRIPTION:
Principles of Neuroscience I is a 13-week course required for students in the Department of Neuroscience. The course covers the cellular and molecular properties of neurons and glia, including neuronal excitability and synaptic transmission, as well as the cell biological aspects of brain function. From the organizational point of view, the course aims to be an interactive experience centered on understanding basic principles of brain cell function that will be used to navigate the course material during paper presentations and group discussions. Ultimately, the course aims to provide students with a toolkit of basic knowledge that will allow them to incorporate new knowledge during the development of their research projects.

Expectations: The course does not follow the traditional college course structure, where exams and homework assignments numerically add to the final grade. Consistent with the goals of graduate education, the class format consists of a combination of formal and informal lectures, daily questions, and student presentations, with a major emphasis placed on interactive class discussions. Feedback, participation, and discussions are important for the learning experience and final evaluation. Moreover, because the basic principles of cellular neuroscience are too numerous and complex to fully cover in class, significant learning outside of the classroom will be expected through provided reading materials, teaching assistants, and the Canvas online discussion forum. In addition to normal course scheduled lectures, the course requires students to attend the weekly Neuroscience Seminar Series and includes lab visits for first-hand learning experiences.

COURSE OBJECTIVES:

1- Understand the chemical and electrical principles that lead to neuronal excitability
2- Understand the principles that underlie neurotransmission, and understand how non-neuronal cells support this process
3- Understand the molecular and cellular mechanisms the give rise to neurotransmission, and how input leads to short and long-term changes in neuronal function

PREREQUISITES:
A basic understanding of general cellular theory, organelles, and the central dogma of molecular biology (from DNA to RNA to protein), as well as a basic understanding of basic electrical concepts, such as Ohms law (V=IR), ions, batteries, resistors, and capacitors is needed. Students should read and review chapter 7-9 of "Principles of Neuroscience 6th Edition (2021), Kandel ER" available from the Einstein Library prior to the start of the class.

If unsure about your preparedness for the course, please reach out to course instructors who may recommend certain readings to resolve any deficits in knowledge.

REQUIRED MATERIALS:
Textbooks are provided as additional learning resources:

- Kandel, E., et al. - Principles of Neuroscience 6th Ed. ISBN-10: 1259642232. ISBN-13: 978-1259642234.
- Johnston, D. - Foundations of Cellular Neurophysiology (excitability is well covered). ISBN-10: 0262100533. ISBN-13: 978-0262100533.
- Raman, I. and Ferster, D. - The Annotated Hodgkin and Huxley: A Reader's Guide. ISBN-10: 0691220638. ISBN-13: 978-0691220635.
- Bear, M., Connors, B., and Paradiso, M. - Neuroscience Exploring the Brain 4th Ed. ISBN-10: 0781778174. ISBN-13: 978-0781778176.
- Byrne, J.- From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience. ISBN 10: 0123971799. ISBN-13: 978-0123971791.

SUITABLE FOR 1ST YEAR STUDENTS:
Yes.

STUDENT ASSESSMENTS:
Attendance and class participation: 25%
Presentations 25%
Final exam 50%.
The Final Exam must be passed to pass the course. However, this is not sufficient. Active participation in class and well-prepared presentations will also be assessed and considered for passing. Students who are not sufficiently participating will be informed by the course leaders to provide them with the opportunity to increase their class participation.

CREDIT HOURS: 6.0

BIOS 7010A – Quantitative Skills for the Biomedical Researcher I

COURSE LEADER:
Ryung S. Kim, PhD

COURSE SCHEDULE:
August 30 – September 20, 2023
Mondays, Wednesdays, 1:20-2:40; Fridays, 1:20-3:10

COURSE DESCRIPTION:
Topics covered will include introduction to probability, discrete and continuous probability models, sampling distributions, the central limit theorem, confidence intervals, and hypothesis testing. While computing is not one of the main learning outcomes, the students will be briefly introduced to the statistical programming language R.

COURSE OBJECTIVES:
This 3-week course aims to acquaint students with the fundamental concepts of biostatistics, applications of basic methods, and their interpretation.

PREREQUISITES:
All students are expected to have basic computer skills and college mathematics. Although not required, we highly recommend those without R experience to attend Beginning R workshop (2 sessions, each 1.5 hours) the week before QSBR 1.

REQUIRED MATERIALS:
Statistical Software: The core learning outcomes of this course are conceptual and *not* learning the software: you will use the statistical software R, but you are not going to need the software for the exam.

Recommended Textbooks: Lecture notes will be posted. These books are not necessary for the course, but they may be helpful resources for your research.

- Marcello Pagano and Kimberlee Gauvreau, *Principles of Biostatistics* (2nd Edition) ISBN-13: 978-0534229023, ISBN-10: 0534229026.
- Bernard Rosner, *Fundamentals of Biostatistics* (8th Edition) ISBN-13: 978-1305268920; ISBN-10: 130526892X

SUITABLE FOR 1ST YEAR STUDENTS:
Not recommended; permission from course leader required if seeking to take this course in the first year.

STUDENT ASSESSMENTS:
Course grade will be based on homework (20%), a midterm exam (30%), and the final exam (50%).

CREDIT HOURS: 1.0

BIOS 7010B – Quantitative Skills for the Biomedical Researcher II

COURSE LEADER:
Kenny Q. Ye, PhD

COURSE SCHEDULE:
September 27 – October 16, 2023
Mondays, Wednesdays, 1:20-2:40; Fridays, 1:20-3:10

COURSE DESCRIPTION:
In QSBR I, the focus is on the basic concepts of statistical inference, especial the idea of quantifying the uncertainty of estimation and reasoning of hypothesis testing. In QSBR II, we will apply the basic concepts of statistical inference to explore relations between two or more variables, and the focus of the teaching will shift from basic concepts towards the art of data analysis. Below are a few things that might help you do well in learning statistics. The best way to learn statistics is to apply your own common sense and reasoning, and applying statistical methods to real problems encountered in your research.
Although math plays an important role in statistics, for the vast majority of biomedical researchers, it is more important to understand what a particular statistical method tries to do than to know the details of the mathematical formula and computational algorithms. In other words, you want to have the big pictures before getting into the details. Mathematics mostly serves the purpose of justifying our common sense and enabling us to handle complicated problems.

For data analysis, it is often much more important to make sense of the data using a variety of visualization tools before describing them with numbers and statistical models.
We will also use software R in this module. It is used mainly for

1. visualizing the data
2. numerical simulation to help understand statistical methods
3. perform some modern statistical computational methods.

Topics to be covered:

Fisher Exact Test and Hypothesis Testing
Chi-square Tests + R session
Correlation and Linear Regression
Regression Diagnostics
One-Way ANOVA + R session
Two-Way ANOVA and Statistical Interactions
Permutation tests (Bring your laptops to the classroom)
Logistic Regression + Extra R session
(Possibly) Repeated Measure and Random Effect Model

COURSE OBJECTIVES:

To build student confidence in understanding and using at least some statistical methods that are not taught in this course when students need them in their future research.

PREREQUISITES:

Quantitative Skills for the Biomedical Researcher I.

RECOMMENDED MATERIALS:

- Peter Dalgaard: *Introductory Statistics with R*. ISBN-13 978-0387790534
- Robert Elston: *Basic Biostatistics for Geneticists and Epidemiologists.* ISBN-13: 978-0470024904; ISBN-10: 0470024909

SUITABLE FOR 1ST YEAR STUDENTS:

Not recommended; permission from course leader required if seeking to take this course in the first year.

STUDENT ASSESSMENTS:

The grade of this course is pass/fail, and usually 10-15% will get pass with honors. The grade will be based on the quality and effort of the homework (67%) and final projects (33%).

CREDIT HOURS: 1.0

BIOS 7010C – Quantitative Skills for the Biomedical Researcher III

COURSE LEADER:
Kith Pradhan, PhD

COURSE SCHEDULE:
October 23 – November 13, 2023
Mondays, Wednesdays, 1:20-2:40; Fridays, 1:20-3:10

COURSE DESCRIPTION:
This course will cover the statistical principles that are pertinent to the study of big–omic data sets being collected in biology. Students will learn about current statistical approaches, issues related to experimental design and reproducible research, and important case studies that illuminate some of the challenges of analyzing big data. This course is the third module of the Quantitative Skills for the Biomedical Researcher series, and builds upon the material covered in the first two modules. As part of the assessment, students will gain practical experience by conducting a mini big data research project while working in small teams.

COURSE OBJECTIVES:
Students are expected to acquire the following learning outcomes by the conclusion of the course:

- An understanding of statistical and computational approaches to analyzing big data sets in the form of gene expression data.
- Practical skills in R programming to process, analyze, and visualize gene expression data.
- Be able to extract published datasets from the literature and re-analyze this data either to reproduce basic analyses or ask new questions of the data.

PREREQUISITES:
Required courses: Quantitative Skills for the Biomedical Researcher I, and Quantitative Skills for the Biomedical Researcher II, or the equivalent in background knowledge.
This course draws upon practical programming skills in R and basic statistics.

REQUIRED MATERIALS:
Statistical Software: The open source, freeware statistical software R will be used.
Recommended Textbook:

- Pagano, M., Gauvreau, K. Principles of Biostatistics, 2nd Edition, ISBN-10: 1138593141.

SUITABLE FOR 1ST YEAR STUDENTS:
Not recommended; permission from course leader required if seeking to take this course in the first year.

STUDENT ASSESSMENTS:
Final project (100%).

CREDIT HOURS: 1.0

BIOS 7020A – Responsible Conduct of Research – Advanced

COURSE LEADER:
Victoria H. Freedman, PhD | Diane Safer, PhD

COURSE SCHEDULE:
October 5 – November 9, 2023
Thursdays, 8:30-10:30

COURSE DESCRIPTION:
This advanced course in the responsible conduct of research is for the more experienced (5th year) graduate students and postdocs. The National Institutes of Health (NIH) requires that all pre-doctoral and post-doctoral trainees receive training in the responsible conduct of research at a frequency of every four years. (All pre-doctoral and post-doctoral trainees are required to take the first instance of the RCR course in year one of training.)

This advanced course will cover the following topics:

- Overview of RCR and Policies
- Data Management Practices and Problems; Rigor and Reproducibility
- Authorship and Publication – Pitfalls and Problems; Strategies for Success
- Mentor and Trainee Responsibilities and Relationship Issues; AToRT
- Effective Communication for Success in Inclusive and Diverse Teams
- Becoming a Resilient Scientist; Balancing Expectation and Reality

The first session will be a general overview and review of institutional, professional and national policies, as well as reporting practices and discussion of some problems in the conduct of science. The following sessions will consist of a mixture of didactic material and small group work to review common scenarios and work together on problem-based case studies.

This course fulfills the NIH retraining in RCR requirement and is *required for PhD students and post-doctoral fellows in the 5th year of training.*

PREREQUISITES:
1st year Responsible Conduct of Research

REQUIRED MATERIALS:
Course readings will be distributed or made available as pdf files on CANVAS.

SUITABLE FOR 1ST YEAR STUDENTS:
No.

STUDENT ASSESSMENTS:
To satisfy this advanced course, attendance at every session for the full session is required. Missing a session (due to illness or professional travel) will require the submission of a make-up assignment in order to complete the course. Students who miss more than one session will be dropped from the course and will be required to re-take the full course.

CREDIT HOURS: 1.0

CLRM 5820 – Epidemiologic Research Methods

COURSE LEADER:
H. Dean Hosgood, PhD

COURSE SCHEDULE:
October 10 – December 19, 2023
Thursdays, 9:00-12:50

COURSE DESCRIPTION:
This course focuses on the analytical issues of epidemiological studies: biases, confounding, interaction, and statistical methods used in case-control and longitudinal studies. In-class exercises will reinforce these concepts. Students are expected to know the basic design issues of retrospective and prospective studies as well as clinical trials from the Clinical Research Intensive course.

PREREQUISITES:
Clinical Research Intensive (summer course).
Students are expected to know the basic design issues of retrospective and prospective studies as well as clinical trials from the Clinical Research Intensive course.

REQUIRED MATERIALS:
Moyses Szklo & F. Javier Nieto: Epidemiology: Beyond the Basics. 3rd Edition, Jones & Bartlett Publishers, Sudbury, Massachusetts, 2012. ISBN-13: 9781449604691; ISBN-10: 1449604692. Available online through the Einstein Library. To access the e-book you must be at Einstein or have remote access to the Library.

SUITABLE FOR 1ST YEAR STUDENTS:
No.

STUDENT ASSESSMENTS:
In-class exercises/class participation 50%, Mid-term test 25%, Final Exam 25%.

(CLOSED REGISTRATION) LIMITED TO 15 STUDENTS NEED APPROVAL FROM PROGRAM DIRECTOR-DR. AILEEN MCGINN (PICK UP COURSE REGISTRATION FORM IN THE GRADUATE OFFICE)

CREDIT HOURS: 3.0

CLRM 5860 – Multivariable Regression

COURSE LEADER:
Aileen P. McGinn, PhD

COURSE SCHEDULE:
September 5 – December 21, 2023
Tuesdays, Thursdays, 9:00-12:50

COURSE DESCRIPTION:
Multivariable Regression builds on the knowledge of univariate and bivariate analyses that were learned in the Clinical Research Intensive course and introduces concepts related to multivariable model building for multiple linear regression, logistic regression and survival analysis. Both the lecture and the lab will focus on multiple regression model building, interpretation and diagnostic tests, assessing for interaction, and statistical adjustment for confounding.

COURSE OBJECTIVES:

- To learn the basics and applications of multivariable regression in assessing associations between exposure/explanatory variables and various forms of outcome variables.
- To use Stata software to conduct multivariable regression and be able to interpret results from the application of these modeling techniques.

REQUIRED MATERIALS:

- Regression Methods in Biostatistics. *Vittinghoff et al*: ISBN-13: 9781461413523; ISBN-10: 1461413524 NOTE: this textbook is available online via the Einstein Library as a pdf
- *Primer of Applied Regression and Analysis of Variance*. *Glantz & Slinker*. ISBN-13: 9780071360869; ISBN-10: 0071360867. NOTE: available for loan via the CRTP Library—please see Nancy Marte in Block 506
- Applied Logistic Regression by David W. Hosmer, Stanley Lemeshow & Rodney X. Sturdivant (3rd edition). ISBN-13: 9781118548356; ISBN-10: 1118548353. NOTE: this textbook is available online via the Einstein Library as a pdf
- Survival Analysis: A Self-learning Text by David Kleinbaum and Mitchel Klein (3rd edition). ISBN-13: 9781493950188; ISBN-10: 1493950185. NOTE: this textbook is available online via the Einstein Library as a pdf

PREREQUISITES:
Clinical Research Intensive; Students are expected to know the material covered in Clinical Research Intensive, including univariate and bivariate statistical analyses and basic epidemiological study designs.

SUITABLE FOR 1ST YEAR STUDENTS:
No. Closed registration: limited to students on the PCI track.

STUDENT ASSESSMENTS: Class Participation 10%, Homework 30%, In-class quizzes 15%, Take home exams 45%.

CREDIT HOURS: 5.5