



# REGS 5200: Fundamentals of Regenerative Sciences Spring 2022 Syllabus and Schedule

## REGS 5200: Fundamentals of Regenerative Sciences

Course Date and Time: February 14-18

Course Location: Virtual

Course Format: Blackboard

Blackboard link: <http://eduonline.mayo.edu>

*\*Use Google Chrome*

Credits: 2

Last Day to Register: February 1<sup>st</sup>

Last Day to Withdraw: February 16<sup>th</sup>

Role	Name	Office	Phone	Email
Course Directors	Saranya Wyles, M.D., Ph.D.	Gonda 16-372	(77) 4-2555	<a href="mailto:Wyles.Saranya@mayo.edu">Wyles.Saranya@mayo.edu</a>
	Andre Terzic, M.D., Ph.D.	Stabile 5-60	(77) 4-5514	<a href="mailto:Terzic.Andre@mayo.edu">Terzic.Andre@mayo.edu</a>
	Richard Hayden, M.D.	SP 1-ENT	(79) 2-2890	<a href="mailto:Hayden.Richard@mayo.edu">Hayden.Richard@mayo.edu</a>
Course Contact	Courtney Paradise	Stabile 5-03	(77) 2-5736	<a href="mailto:Paradise.Courtney@mayo.edu">Paradise.Courtney@mayo.edu</a>
TA's	Armin Garmany	Stabile 5-48		<a href="mailto:Garmany.Armin@mayo.edu">Garmany.Armin@mayo.edu</a>
	Dileep Monie	Gonda 19-400		<a href="mailto:Monie.Dileep@mayo.edu">Monie.Dileep@mayo.edu</a>
	Eric Grewal	MI 1-25.2		<a href="mailto:Grewal.Eric@mayo.edu">Grewal.Eric@mayo.edu</a>
	Connor Lentz	SC-AB 1-300		<a href="mailto:Lentz.Paul@mayo.edu">Lentz.Paul@mayo.edu</a>

*\*Office hours by appointment.*

### PREREQUISITES

None

### COURSE DESCRIPTION

This course strategically encompasses the Principles and Practice of Regenerative Medicine, Regenerative Procedures, the Patient Portal to Clinical-Grade Manufacturing, Bench-to-Bedside Translation, and What Regenerative Medicine Means to You. This course will follow a discovery-translation-application curriculum that encourages students to integrate new knowledge into clinical practice. Interactive online lectures, virtual laboratory demonstrations, clinical highlights, and simulated patient interactions will enrich the content of this course and provide students with a unique experience of regenerative care at Mayo Clinic. This primer course establishes the medical science foundation by introducing regenerative science principles, the regenerative toolkit and the industry model. The fundamentals course highlights the regenerative medicine lexicon that serves as the basis for advanced clinical care.

### LEARNING OBJECTIVES

At the end of this course, learners will be able to:

#### Educational Objectives

Successful completion of the two-part graduate school course and medical school selective will enable the students to achieve the following educational goals:

#### Regenerative Medicine: Principles to Practice

- Recognize patient unmet needs and how regenerative medicine offers a curative paradigm
- Understand the fundamental principles, tools, and platforms of regenerative medicine
- Describe the diagnostic and therapeutic applications of regenerative medicine and surgery
- Engage with the patient population seeking regenerative solutions

## **REGS 5200: Spring Syllabus**

### **Regenerative Procedures**

- Understand the challenges to effective delivery of regenerative therapeutics
- Understand how current techniques are being used to provide regenerative solutions
- Engage in regenerative surgical techniques utilized in clinical trials

### **Patient Portal to Clinical-Grade Manufacturing**

- Understand and demonstrate proficiency in the current practice
- Understand how cells are generated for clinical utilization (cGMP)
- Recognize the process leading to clinical utilization of regenerative therapeutics
- Recognize the current role of regenerative medicine and surgery in patient care

### **Bench-to-Bedside Translation**

- Understand how current ethical issues have influenced the progress of stem cell research
- Recognize the importance of preclinical models for testing feasibility, safety and efficacy of regenerative therapeutics
- Understand the techniques used to deliver cell-based biologics in models of disease

### **Regenerative Medicine: What does this mean to me?**

- Demonstrate an understanding for regenerative medicine and its contribution to meet patient and societal needs
- Learn about how to incorporate regenerative strategies into your clinical training
- Understand the steps to bring discovery into the community through commercialization and outreach

### **COURSE FORMAT**

This course is a one-week selective that will take place in person and virtually through Blackboard. Students can expect to have activities from 9am-3:30pm CST each day. Students will be expected to complete reading and assignments independently.

### **REQUIRED READING**

Students will be expected to read the articles/publications posted in the pre-class assignment section of Blackboard before class each day.

### **SUGGESTED RESOURCES/REFERENCE MATERIALS**

See blackboard for resource/reference materials.

### **ATTENDANCE & PARTICIPATION FOR MEDICAL SCHOOL SELECTIVE**

- Discussion and engagement during the course
- Students will be expected to attend a minimum of three days to receive credit for the course
- Graduate students, please see the section below on "Assessment of Student"

### **COURSE OUTLINE – SCHEDULE SUBJECT TO CHANGE**

- **Monday, February 14<sup>th</sup>**
  - Richard Hayden, M.D. – Why Regenerative Medicine?
  - Quinn Peterson, Ph.D. – Stem Cell Biology
  - Stephen Ekker, Ph.D. – 3B (Bench-Business-Bedside Discussion)
  - Clifford Folmes, Ph.D. – Fueling the Stem Cell Fate
  - Guojun Bu, Ph.D. – Engineering Organoids
  - Matthew Houdek, M.D. – Onco-Regeneration Lexicon
  - Annapoorna Sreedhar, Ph.D. – Entrepreneurship Course

## REGS 5200: Spring Syllabus

- **Tuesday, February 15<sup>th</sup>**
  - Eric Grewal – Regenerative Lexicon
  - Naureen Javeed, Ph.D. – Cell-free Exosome-based Regeneration
  - Isobel Scarisbrick, Ph.D. – Regeneration In Vivo
  - Speaker TBD – Tissue Engineering: Opportunities and Challenges
  - Course Teaching Assistants – Reflections from Regenerative Medicine Educational Immersion
  - Saad Kenderian, M.B., Ch.B. – Regenerative Immunotherapy (CAR-T)
  - Annapoorna Sreedhar, Ph.D. – Entrepreneurship Course
  - Michael McPhail, Ph.D. – 3D Bioprinting Discussion
  
- **Wednesday, February 16<sup>th</sup>**
  - Julie Allickson, Ph.D. – Advanced Biomanufacturing for Biologic Therapeutics
  - Jos Malda, Ph.D. – Power of Biofabrication
  - Heather Hatcher, Ph.D. – Regulatory Guidance: Start to Finish
  - Rob Kirkton, Ph.D. – Part I: The Human Acellular Vessel (HAV) Story – Humacyte
  - Todd Rasmussen, M.D. – Part II: The Human Acellular Vessel (HAV) Story – Vascular Implant for Limb Salvage
  - William Faubion, Jr., M.D. – Example of Implantable Regenerative Scaffold
  - Annapoorna Sreedhar, Ph.D. – Entrepreneurship Course
  
- **Thursday, February 17<sup>th</sup>**
  - Satsuki Yamada, M.D., Ph.D. & Armin Garmany – Translational Validation
  - Drew Witter – The Regulatory Pathway
  - Christopher Paradise, Ph.D. – Product Development & Characterization
  - Atta Behfar, M.D., Ph.D. – Translating the Extracellular Vesicle Platform to Clinic
  - Karthika Perumal, Ph.D. – Intellectual Property Guidance: Start to Finish
  - Douglas Brownfield, Ph.D. – 3D Lung Organoid
  - Amaris Castanon (Cell Ink) – 3D Skin Organoid
  - Jacob Sellon, M.D. – Ultrasound Guided Stem Cell Injection
  
- **Friday, February 18<sup>th</sup>**
  - Ian Hargraves, Ph.D. – Holistic Regeneration: From Fighting Disease to Restoring Health
  - Abba Zubair, M.D., Ph.D. – Stem Cells in Space
  - Amy Oxentenko, M.D. – Social Media Talk
  - Daniel Saris, M.D., Ph.D. – Impact on a Regenerative Medicine Patient’s Life
  - Andre Terzic, M.D., Ph.D. – Concluding Lecture

### ASSESSMENT OF STUDENT (APPLIES TO GRADUATE STUDENTS ENROLLED IN REGS 5200 ONLY)

- There will be a short-answer exam at the end of the course in addition to a 3-minute thesis/journal club presentation

<i>Element</i>	<i>Percentage</i>
Daily Participation	20%
Thesis/Journal Club Presentation	30%
Short-Answer Exam	50%

### GRADING SYSTEM

S = standard letter (see scale below)

A = 96-100	B+ = 87-89	B- = 80-83	C+ = 75-79	F = Below 70
A- = 90-95	B = 84-86		C = 70-74	

## GRADING RUBRICS

**Exams** There will be an open book and open resources exam administered in a short answer format. Questions will reflect topics covered during the lectures including definitions of regenerative medicine toolkit and clinical translation process. This will be a take home exam which can be submitted one week after the course.

**Presentations** Students will create a short presentation on a topic related to Regenerative Medicine, reflecting either a personal scientific research project or a peer-reviewed publication of interest from the literature. The presentation must include a visual aid, with sections including background, methods, results, and conclusions. Students will be graded based on their presentation skill, quality of poster or slide used, success in tailoring a complex regenerative topic to the audience, and their competency in addressing audience and instructor questions.

## WITHDRAWAL PROCESS

If you are considering withdrawing from the course, you are encouraged to discuss your options with the course director/instructor. However, if you decide to withdraw, please follow the following process to ensure your withdrawal is received and accepted by the Mayo Clinic Graduate School of Biomedical Sciences.

- Submit the [Late Registration/Course Withdrawal Form](#) **before or on** the date noted above.
- Withdrawal forms **MUST** be received by the indicated date above and on the course schedule below. An attempt to withdraw after that date will not ensure removal of a grade or Incomplete on your transcript.
- Verbal and/or email withdrawal requests will not be accepted.

## VIRTUAL LEARNING RESOURCES

- At minimum, a Blackboard shell of the course must exist with syllabus but delivery of content can be done using other options, such as Zoom.
- See resources on the [MCGSBS Virtual Learning page](#).
- Blackboard is best optimized with Google Chrome. DO NOT USE INTERNET EXPLORER.

## Technical Assistance

If you need technical assistance at any time during the course or to report a problem with Blackboard, visit the ETC Blackboard [Webpage](#).

## POLICIES

You are responsible for knowing and complying with all [MCGSBS-applicable Policies and Procedures](#), including but not limited to, the most relevant listed below.

- **Course and Syllabus Management Policy:**  
<http://mayocontent.mayo.edu/collegeofmedicine/DOCMAN-0000204351>
- **Course Registration & Withdrawal Policy:**  
<http://mayocontent.mayo.edu/collegeofmedicine/DOCMAN-0000149781>
- **Non-Academic Deficiency Policy:**  
<http://mayocontent.mayo.edu/collegeofmedicine/DOCMAN-0000140215>

## Plagiarism Guidelines

- All work submitted must consist of the student's original ideas. If other sources are included in your work, they must be properly identified and cited. You may not use work you submitted for another course unless approved by the course director.
- Plagiarism is a form of academic dishonesty. Penalties for plagiarism range from failing the course to suspension from Mayo Clinic Graduate School of Biomedical Sciences.
- Faculty will utilize plagiarism tools to monitor for academic honesty for work submitted.

## *REGS 5200: Spring Syllabus*

### **Plagiarism Resources**

To ensure you are not inadvertently plagiarizing please utilize the [text matching](#) services offered through Scientific Publications.

**Research Misconduct Policy:** [http://mayocontent.mayo.edu/research-policy/MSS\\_661918](http://mayocontent.mayo.edu/research-policy/MSS_661918)

### **Mayo Clinic Social Media Code of Ethics**

- **Brand Resource Center:**  
<http://intranet.mayo.edu/charlie/brand-standards/media-specific-standards/social-media/social-media-code-of-ethics/>
- **Social Media Policy (College):**  
<http://mayocontent.mayo.edu/collegeofmedicine/DOCMAN12-0000414980?qt=Social%20Media>

### **COURSE ACCESSIBILITY STATEMENT**

The Mayo Clinic College of Medicine and Science (MCCMS) strives for an inclusive learning environment. If you anticipate or experience any barriers related to the format or requirements of this course, please contact the instructor to discuss ways to ensure full access. If you determine that additional disability related accommodations are necessary, please contact the Office of Wellness and Academic Success-Disability Services office at [MCCMC.DS@mayo.edu](mailto:MCCMC.DS@mayo.edu) to schedule an appointment.