IMPORTANT: This syllabus form should be submitted to OAA (gsbs_academic_affairs@uth.tmc.edu) a week before the start of each semester.

NOTE to STUDENTS: If you need any accommodations related to attending/enrolling in this course, please contact one of the Graduate School's 504 Coordinators, Cheryl Spitzenberger or Natalie Sirisaengtaksin. We ask that you notify GSBS in advance (preferably at least 3 days before the start of the semester) so we can make appropriate arrangements.

Term and Year: **Fall 2022** Course Number and Course Title: **GS04 1081: Stem Cells in BioMedicine** **Credit Hour: 1** **Meeting Location: via Online (see zoom link below)** **Building/Room#: UT-GSBS** **WebEx/Zoom Link:** Meeting URL: **https://mdacc.zoom.us/j/81971941691?pwd=VzlEVkhPaHFmaE41NzZWd1BUWWF2QT09** Meeting ID: **819 7194 1691** Password: **841515**	**Program Required Course: No** **Approval Code: No** **(If yes,** the Course Director or the Course Designee will provide the approval code.) **Audit Permitted: Yes** **Classes Begin: September 6, 2022** **Classes End: December 13, 2022** **Final Exam Week: Dec. 6, 2022**

Class Meeting Schedule

Day	Time
Every Tuesday	**10:00 – 11:00 AM**

Course Director Name and Degree: **Huamin Wang, MD, PhD** Title: **Professor** Department: **Pathology, Anatomical** Institution: ***MDACC*** Email Address: hmwang@mdanderson.org Contact Number: **713-563-1846**	**Instructor/s** 1. **Yong-Jian Geng, MD, PhD** Institution: ***UTH*** Email Address : Yong-Jian.Geng@uth.tmc.edu 2. **Huamin Wang, MD, PhD** Institution: **MDACC** Email Address: hmwang@mdanderson.org 3. **Jinsong Liu, MD, PhD** Institution: **MDACC** Email Address: jliu@mdanderson.org

	4. **Simona Colla, PhD** Institution: **MDACC** Email Address SColla@mdanderson.org 5. **Krishna P. Bhat, PhD** Institution: **MDACC** Email Address: kbhat@mdanderson.org 6. **Senduria Mani, PhD** Institution: **MDACC** Email Address: mani@mdanderson.org

Course Description: A stem cell is a cell from the embryo, fetus, or in any adult organs, that has the ability to reproduce itself for long periods of time, and at a given signal, give rise to many specialized cell types in the body. Apart from embryonic stem cells, adult stem cells maintain this capability throughout the life of an organism. In recent years, scientific advances have suggested that stem cells could be of great potential use in the treatment of a variety of diseases.

The objective of this graduate school course is to provide the students with information about stem cell origin, their role in early development, their isolation and therapeutic promises for the future. This course will also offer students a great opportunity to take part of recent ground-breaking advances in stem cell biology. All in all, the material presented is intended to evoke more interest in the field of stem cell biology, both for the student, the layman, as well as for the bench scientist. Ultimately, the long-term goal is to encourage future research in finding alternative therapeutic modalities in stem cell-related diseases, such as cancer, Parkinson's, diabetes, atherosclerosis, congenital diseases, and Alzheimer's disease. This course is taught by a group of high-profile scientists with a broad expertise in stem cell biology, biochemistry, clinical applications, and ethics.

Textbook/Supplemental Reading Materials

- No textbook is required. All readings will be from primary research articles, review articles, selected book chapters, and will be posted or emailed as pdf files or links. The course director or lecture-presenters will also post the syllabus, schedule, lecture slides, lab information, short movies, or animations, etc.

Optional Reading:

The Science of Stem Cells
Jonathan M. W. Slack
Edition: Illustrated, 2018

Stem Cells: Biology and Application
Mary L. Clarke and Jonathan Frampton
1st Edition, 2020

Major Learning Course Objectives:

Upon successful completion of this course, students will be able to:

- Explain the specific characteristics, progeny, and sources of different types of stem cells.
- Relate the importance of stem cells to the development and maintenance of multicellular organisms.
- Describe how a niche can regulate stem cell biology and cite some specific examples.
- Understand how cell-cell signaling maintains stem cells and influences the differentiation of specialized cells.
- Describe how asymmetric cell division contributes to stem cell behavior and cite specific examples.
- Describe how stem cells can be used for medical purposes and cite specific examples in different organs and tissues.
- Understand how defects or malfunction in stem cell behavior can lead to medical problems under various disease conditions.
- Understand complex molecular, cellular, and genetic techniques used to investigate stem cell biology.
- Describe current limitations of stem cell biology applications and areas of active research.

Student responsibilities and expectations:

After the course, students are expected to know basic concepts and different isolation techniques of both embryonic as well as adult stem cells. Furthermore, the students should exhibit a better understanding of the basic molecular mechanisms during proliferation and differentiation. Also, students are also expected to gain better insight into the different technologies and latest advancements in the treatment of a variety of diseases.

Grading System: Letter Grade (A-F)

Grading Scale: The grading scale consists of A, B, C or F: A=75-100%, B= 50-75 %, C=25-50 %: Fail= 0-25%.

Note: All materials given out during classes are protected by copyright and should therefore not be used for distribution outside the classroom.

Student Assessment and Grading Criteria : *(May include the following:)*

Percentage	Description
Homework (0 %)	No homework is required. However, questions and answers may be undertaken outside of classroom.
Quiz (10 %)	Quiz will be conducted every two month to assess the student's course learning.

Presentation (5 %)	Students will give case report and PPT presentation about stem cell application.
Final Exam (80 %)	Final exam will take place in the last Tuesday of the course. It will take 2-3 hours.
Participation and/or Attendance (5 %)	All registered students must attend at least 70 % of class time to be considered eligible for grading. If a student misses a class, he/she is responsible to contact the class coordinator as soon as possible. During the course, all students are expected to arrive early to ensure an enjoyable and non-interruptive environment for the other participants.

CLASS SCHEDULE

Date	Duration (Hour(s) taught by lecturer)	Lecture Topic	Lecturer/s
September 6	**1**	Introduction – Basics of stem cell biology and regenerative medicine	**Wang/Geng**
September 13	**1**	Stem cell isolation, culture, preparation and facility	**Geng**
September 20	**1**	Growth factors for stem cell proliferation and differentiation	**Geng**
September 27	**1**	Stem cell and tumor metastasis	**Mani**
October 4	**1**	Stem cell delivery and transplantation to diseased sites	**Geng**
October 11	**1**	Genetics and epigenetics of stem cells	**Geng**
October 18	**1**	Stem cell niching in normal and pancreatic tumor development	**Wang**
October 25	**1**	Mesenchymal and myogenic stem cells in cardiovascular disease	**Geng**
November 1	**1**	Neural stem cells and and malignant glioma stem cells	**Krishna**
November 8	**1**	Giant Cancer Stem Cells	**Liu**
November 15	**1**	Hematopoietic stem cells and hematologic disorders	**Colla**
November 22	**1**	Stem cells for disease modeling and drug screening	**Geng**
November 29	**1**	Stem cells for rare diseases	**Geng**
December 6	**1**	Somatic cell reprogramming and iPS cells for therapy	**Geng**
December 6	**2**	Final Exam	**Wang/Geng**

HW/jal