

**IMPORTANT:** This syllabus form should be submitted to OAA ([gsbs\\_academic\\_affairs@uth.tmc.edu](mailto: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.

<p><b>Term and Year:</b></p> <p><b>Course Number and Course Title:</b></p> <p><b>Credit Hours:</b></p> <p><b>Meeting Location:</b></p> <p><b>Building/Room#:</b></p> <p><b>WebEx/Zoom Link:</b></p>	<p><b>Program Required Course:</b>    Yes    No</p> <p><b>Approval Code:</b>    Yes    No</p> <p>(If yes, the Course Director or the Course Designee will provide the approval code.)</p> <p><b>Audit Permitted:</b>    Yes    No</p> <p><b>Classes Begin:</b></p> <p><b>Classes End:</b></p> <p><b>Final Exam Week:</b></p>
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**Class Meeting Schedule**

Day	Time
(Thursday)	

<p><b>Course Director</b> Name and Degree: Title: Department: Institution:    <i>UTH</i>    <i>MDACC</i> Email Address: Contact Number:</p> <p><b>Course Co-Director/s:</b> (if any) Name and Degree: Title: Department: Institution:    <i>UTH</i>    <i>MDACC</i> Email Address: Contact Number:</p> <p><b>Office Hours:</b></p>	<p><b>Instructor/s</b> (Use additional page as needed)</p> <p>1. Name and Degree: Institution: Email Address :</p> <p>2. Name and Degree: Institution: Email Address :</p> <p>3. Name and Degree: Institution: Email Address:</p> <p>4. Name and Degree: Institution: Email Address:</p>
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GS21 1351 Nano course in Cardio-oncology (2023)

Director: Drs. Jun-ichi Abe and Michael S. Ewer

Dates: September 7<sup>th</sup> – December 14<sup>th</sup>

Time: 4:00 pm – 5:15 pm (CST)

Place: GSBS Conference room S3.8355

Class meets every Thursday of the week.

For more information/questions: Dr. Jun-ichi Abe (585-474-5456);

jabe@mdanderson.org

Course materials will be available through Onedrive and Dropbox, for access contact: Jun-ichi

Abe

Synopsis: This course is designed to provide students with not only a comprehensive overview of the structure and function of the cardiovascular system (CVS) in both normal and pathological states, but also cancer and cancer treatment can affect CVS function. Disease processes affecting normal cardiovascular homeostasis will be discussed in the context of both human disease and experimental model systems. The course will introduce clinical/translational topics, signal transduction and current therapies of both the CVS and cancer, and potential avenues for novel cardiovascular research from the view of cardio-oncology. Lecturers include both clinical and basic scientists, providing a bench-to-bedside addition to the Ph.D. curriculum. There will be one 75-minute meetings per week, which will include lectures, paper discussions, case studies and lab studies. Evaluations will be based on a class participation, and written review. The course is designed as an elective for students from numerous programs, and will ultimately be expanded into a two-semester course. There are no prerequisites for this course. Class size will be from 4-20 students, including a limited number of auditors. Auditors need to register for the course. Lectures are based on historical and recent literature. There is no required textbook, but can use “Cancer and the Heart” as the supplemental reading.

Learning Objectives

1. Understand the principles, challenges, approaches, and strategies of cardio-oncology research. Therefore, the trainees will be expected to attain the basic knowledge in terms of cancer treatment-associated CVD as well as both CVD and cancer treatments.
2. Understand the cardiac and vascular structure, and circulation system and function, and get the picture of the pathophysiology of common and major diseases of the cardiovascular system.
3. Grasp the molecular basis of cardiac contractility (e.g. E-C coupling, myosin-actin filaments) and electrophysiology (e.g. A-V conducting system and ion channels), and describe how abnormalities of these mechanisms produce important cardiovascular diseases, and understand the basics and molecular mechanisms of the process of vascular injury including atherosclerosis, aneurysm, restenosis, and hypertension.
4. Appreciate the importance of genetic factors in certain cardiovascular diseases and cancer treatment-associated CVD, and how to approach and analyze it.
5. Understand the current pharmacological strategy against CVD including ACEs,  $\beta$ -blockers, and PDE inhibitors in non-cancer patients.
6. Understand the current pharmacological strategy against oncogenesis, especially related to signal transduction and epigenetics including tyrosine kinase inhibitors (TKIs), DNA synthesis, histone de-acetylase (HDACs), and proteasome inhibitors.
7. Learn the incidents, pathogenesis, diagnosis, management, and prevention against cancer treatment associated CVD including heart failure, coronary and cerebral events, hypertension, thromboembolism, and arrhythmia.

8. Recognize the contribution of premature aging process in CVD, cancer, and cancer treatment-associated CVD, especially for long-term effects after therapy, and its molecular mechanisms.
9. Understand the contribution of cancer treatment in increasing risk factors of CVD such as hypercholesterolemia and obesity and its molecular mechanisms.
10. Obtain the ability to critically evaluate the literatures related cancer treatment-associated CVD.
11. Apprehend and be able to articulate the potential and future directions of cardio-oncology including targeting the down-stream or CVD specific events induced by cancer treatments, which will prevent CVD but will have no effect on the efficacy of cancer treatment. For example, topoisomerase-II $\beta$  (top2 $\beta$ ) is reported to be one of the direct target molecules of cardiotoxic drugs of the anthracycline family. Thus, depletion of top2 $\beta$  ameliorates anthracycline-mediated cardiotoxicity. Notably, since the heart only expresses top2 $\beta$ , new anthracycline that only poisons top2 $\alpha$ , but not top2 $\beta$ , will be beneficial for healing cancer, but avoiding cardiomyopathy.

Sept.	7	Why cardio-oncology?	Dr. Jun-ichi Abe
	14	Patho-physiology of CVD in Cardio-oncology	Dr. Jun-ichi Abe
	21	Anti-cancer drugs and cardio-oncology	Dr. Nicolas Palaskas
	28	Radiation-Induced Heart Disease: Mechanism and Prevention	Dr. Steven H. Lin
Oct	5	Cardiovascular health during cancer care	Dr. Elie Mouhayar
	12	Cardiovascular toxicity in pediatric cancer patients	Dr. Eugenie Klieinerman
	19	Radiation and CVD toxicity from the perspective of cardiologist	Dr. Syed Wamique Yusuf
	26	Cancer Therapy-related CVD toxicity	Drs. Anita Deswal
Nov	2	Emergency Department in the Cancer Center: The front line and the last stand against cancer	Drs. Cielito C. Reyes-Gibby and Sai-Ching J Yeung
	9	Exercise and cancer	Dr. Keri Schadler
	16	Arrhythmias in cardio-oncology	Dr. Peter Kim
	30	Type 1 vs Type 2 cardiotoxicity	Dr. Michael Ewer
Dec	7	Genetics and iPSC-cardiomyocytes: tools for understanding cardiotoxicity	Dr. Michelle Hildebrandt
	14	Cardiometabolic health and cardiovascular disease in patients with prostate cancer	Dr. Efstratios Koutroumpakis