COURSE SYLLABUS

1 ECE 9900 - 3-D Cell Cultures

2 Meeting Information

3 credits, 3 contact hours 2 hr 40 min lecture

a. **Section 001:**
Lecture: R1815-2055, **DRSDCK-B70**

b. **Section DL1:**
Lecture: R1815-2055, **ONLINE-SYN**

3 Course Instructor(s), TA(s)

a. **Section 001:**

Class Instructor:	Rosalind Wynne
Office Hours:	Appointment Link, or by appt.
TA:	None

b. **Section DL1:**

Class Instructor:	Rosalind Wynne
Office Hours:	Appointment Link, or by appt.
TA:	None

4 Textbook

This course does not have a prescribed textbook

a. **Other Supplemental Materials:**

(a) "Basic Concepts on 3D Cell Culture" edited by Cornelia Kasper, Dominik Egger and Antonina Lavrentieva, Springer, 2021.

(b) "Optofluidics: Fundamentals, Devices, and Applications" by David Erickson and Demetri Psaltis, McGraw-Hill, 2009

(c) B.E.A. Saleh and M.C.Teich, “Fundamentals of Photonics”, 2nd Edn. Wiley, 2007.

(d) S.O. Kasap, “Optoelectronics and Photonics”, 1st. Edn. Prentice-Hall, 2001.

(e) Andrea Cusano,Marco Consales, Alessio Crescitelli, Armando Ricciardi, “Lab-on-Fiber Technology”, Springer 2015, DOI 10.1007/978-3-319-06998-2

5 Specific Course Information

a. **Catalog Description**
This course provides an in-depth understanding of 3D cell culture techniques and optofluidic technologies. Students will explore the principles, methodologies, and applications of these technologies in biomedical research and clinical diagnostics.

b. **Prerequisites:** None; **Co-requisites:** None

c. ECE Graduate Course

6 Learning Objectives

a. Students will explore the principles, methodologies, and applications of these technologies in biomedical research and clinical diagnostics. The course will cover the design, fabrication, and implementation of 3D cell culture systems and optofluidic devices, emphasizing their role in advancing tissue engineering, drug discovery, and personalized medicine.

7 List of Covered Topics

1. Understand the fundamental principles of 3D cell cultures and optofluidics.
2. Assess the design of 3D cell culture systems and optofluidic devices.
3. Analyze the applications of these technologies in biomedical research and clinical diagnostics.
4. Evaluate the challenges and future directions in the field.
5. Discuss innovative solutions integrating 3D cell cultures and optofluidics.

8 Tentative Schedule

Tentative schedules for all sections follow. Be sure to refer to the schedule for your specific section, if more than one is provided.

Tentative Schedule for **All Sections**

Week #	Lecture Content
1	Introduction to 3D Cell Cultures and Optofluidics
2	Principles of 3D Cell Cultures
3	Scaffold-Based 3D Cell Cultures
4	Scaffold-Free 3D Cell Cultures
5	Introduction to Optofluidics
6	Optofluidic Devices and Components
7	Midterm Exam
8	Semester Recess
9	Applications of 3D Cell Cultures in Biomedical Research
10	Optofluidics in Biomedical Applications
11	Integration of 3D Cell Cultures and Optofluidics
12	Easter Recess
13	Advanced Techniques in 3D Cell Cultures
14	Advanced Optofluidic Technologies, Final Project Presentations
15	Ethical and Regulatory Considerations, Final Project Presentations
16	Final Project Presentations

9 Grading Policy

Your final grade will be determined from the following: Homework 20%, Discussion boards 20%, Clinical/Consultations 15%, Exams/Presentations 45%

The scale used to assign letter grades is: Letter grade scale: A(93–100), A–(90–92), B+(87–89), B(83–86), B–(80–82), C+(77–79),
C(73–76), C–(70–72), D+(67–69), D(63–66), D–(60–62), F(<60)

Grade Reconciliation: Disagreements about penalties are to be addressed in writing clearly indicating the discrepancy. Please cite sources that support your position. Quizzes and Exams Activities: All related activities are closed notes and text. Special considerations should be presented before execution of activity.

10 HW Assignment and Laboratory Report Submission Policy

Homework submissions are required to be legible and of professional quality. There will be two homework assignments. Assignments are required to be submitted in PDF format via Blackboard.

AI Tools are permitted for use in Discussion board assignments and Consultation assignments with appropriate disclosure during assignment submission.

Presentation: Students will independently present prescribed technical articles or design problem relevant to topics covered in this course (i.e. organ on a chip, optofluidics, etc.). This assignment requires the student to provide the following attributes.

- Provide a 1-page summary of the article (i.e. 1000 words) submitted to Blackboard.

- Provide a half-page bibliography and BibTeX files submitted to Blackboard.
- Provide appropriate description/illustration and discuss device applications or technical relevance.
- The presentation should be 15-20 minutes long and include 5-10 Powerpoint slides that are submitted to Blackboard.

11 Attendance Policy

General Rules

The full version of the official Villanova class attendance policy is posted at https://live-villanova-catalog.cleancatalog.io/class-attendance, but the main points are as follows.

Attendance is encouraged.

Whenever possible, students should inform the instructor if they plan to be late or absent from class. In all cases, documentation is required to petition for *excused* absences to the Associate Dean for Student and Strategic Programs, Dr. Stephen Jones. The excused absence form is posted on this page: https://villanova.sharepoint.com/teams/COECurrentUndergrads/SitePages/Catalog.aspx under the heading "Engineering Academic Policies and Forms".

Excused absences do not count towards a failure in the course for first year students. Absence from class does not release the student from assigned work. Students who miss an in-class obligation such as an exam, a presentation, etc., due to an excused absence will not be penalized - the instructor may offer a make-up test, arrange an alternative time for a presentation, exempt a student from the assignment, or provide another arrangement. In the case of illness or injury, the form must be submitted within 24 hours of missing a class. The University's list of excused absences for all students includes the following:

1. Participation in NCAA athletic competitions
2. Participation in special academic events such as: conferences, field trips, project competitions, etc., and in official university business such as student representatives attending meetings related to university governance
3. Attendance at significant events of the immediate family such as: funerals, weddings, etc.
4. Religious holidays - see the University's policy on Religious Holidays
5. College-approved participation in placement activities such as: job interviews, graduate school interviews, job fairs
6. Legally required absence such as: jury duty, court appearance, short-term military service
7. Documented serious illness or disability

Personal Days

Personal Days are NOT allotted for laboratory sessions and courses that meet once a week. For all other courses that meet at least twice a week, students are entitled to excused absences for any reason that may contribute to their personal wellness. The following rules apply.

Students must advise the instructor by email *before* class of their intent to utilize a Personal Day as the reason for their absence. A Personal Day will not be approved retroactively. Students may, but are not required, to provide additional information regarding their absence. A Personal Day does not grant an automatic extension for items due. Students remain responsible for all assignments, exams, presentations, etc. due on that date. The instructor may apply her/his discretion

on a case-by-case basis to determine whether an extension on a deliverable item is appropriate.

For classes that meet thrice a week (50 mins $\times$ 3), TWO personal days are allowed in the semester. These personal days may not be used ...

1. on consecutive class days
2. in the same week
3. immediately preceding or following a University holiday or break period, and
4. on days when exams, presentations or other major assignments are scheduled.

For classes that meet twice a week (75 mins $\times$ 2), ONE personal day is allowed in the semester. This personal day may not be used ...

1. immediately preceding or following a University holiday or break period, and
2. on days when exams, presentations or other major assignments are scheduled.

12 Examination Policy

The College of Engineering has adopted the following general examination guidelines:

1. Students must arrive before the start of the examination. Under exceptional circumstances a student may need to arrive late, but he/she can enter the examination room no later than 5 minutes after the start of the exam.
2. All cell phones and smart devices must be turned off and stored away until the student exits the exam room, unless explicitly permitted by the instructor.
3. The official Villanova class attendance policy must be followed when requesting excuses for absences or lateness to an examination.
4. Each student must write and sign the following statement, "I have neither given nor received any unauthorized assistance in the completion of this examination."
5. In the case of virtual exams, the instructor may implement video proctoring or other measures to ensure academic integrity. For consent purposes, the instructor will announce ahead of time to students if they plan to use any form of video proctoring during an assessment and whether a recording will take place.

13 Academic Integrity Policy

The College of Engineering is committed to creating an environment of academic integrity and ethical decision-making that we hope is reflected in the actions of our students and graduates. As Villanova students, integrity is central to the University mission. As engineers, our code of conduct requires us to place honor and integrity at the forefront of everything we do. As engineering students, it is expected that you will begin to adopt these values and instill them into your work habits. Students violating the academic integrity policy will receive a zero on that assignment or exam and the violation will be reported to the Associate Dean for Academic Affairs. The University's academic integrity policy can be found on the following web page:
https://live-villanova-catalog.cleancatalog.io/academic-integrity-0.

14 Adherence to the Student Code of Conduct

Students are expected to act in a professional and respectful manner to their fellow students, faculty, and staff. Students should become acquainted with and understand the responsibilities set forth in the Student Handbook, especially those in the sections on Policy and Regulations. Adherence to university regulations is expected and required for successful completion of the program of studies. Enforcement within the classroom of policies regarding classroom behavior is the responsibility of the faculty member. All other discipline problems are to be referred to the Dean of Students.

15 Inclusive Classroom

This classroom is a place where you will be treated with respect; we welcome individuals of all ages, backgrounds, beliefs, ethnicities, gender, gender identities and expressions, sexual orientation, and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment to allow all among us to learn and flourish.

16 Students with Disabilities

It is the policy of the university to make reasonable academic accommodations for qualified individuals with disabilities. If you are a person with a disability (non-physical) please register with the office of Learning Support Services (LSS) by emailing Learning.support.services@villanova.edu or by phoning 610-519-5176 as soon as possible. Registration is *required* in order to receive accommodations. In addition, please contact the instructor during office hours in order to make the appropriate arrangements.

The Office of Disability Services (ODS) collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with physical the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact and register with Gregory Hannah, advisor to students with disabilities at 610-519-3209 or visit the office on the second floor of the Connelly Center.

17 Tutoring Services

Villanova's tutoring services include The Writing Center, The Learner's Studio, and The Center for Speaking and Presentation. These services are offered free of charge to students. Drop in as-needed or book a regular weekly session to supercharge your academic success. Sessions can be 30 or 60 minutes in length.

Register for an account and book sessions in advance at villanova.mywconline.com. If you don't see your class listed, request a tutor for a missing subject at: tutorrequest.villanova.edu For more information, contact Juliana Struder at juliana.studer@villanova.edu or at 610-519-5862.

18 Online Expectations

Some or all sessions of this class may be recorded for educational purposes and for later playback. In order to foster a professional environment, please wear appropriate clothes, refrain from eating, mute your microphone when you are not talking so as to eliminate background noise, and select an appropriate setting free of distractions. You may turn off your webcam for privacy reasons

unless explicitly instructed not to do so by the instructor (such as during the conduct of online examinations).

19 Electronics Policy

The use of electronic devices, such as phones, laptops, tablets, calculators, etc., during class is generally allowed, unless their use causes a disturbance to others. During examinations, the use of any electronic device is prohibited, unless it is expressly authorized by the instructor.

Students are prohibited from making any audio or visual recordings (including taking photographs) of lectures, discussions, or other classroom activities, unless a student (1) has written permission in advance from the instructor, or (2) is permitted to record under terms and conditions as approved by the University's Office of Disability Services or Learning Support Services. Students who have received approval to record classes as an academic accommodation must provide supporting documentation from the Office of Disability Services or Learning Support Services in advance of any recording. Students may use authorized recordings only for the purposes of individual study in the course, and may not disseminate or share them with a wider audience without explicit permission.

20 Copyright Policy

The materials used in Villanova University courses ("Course Materials") generally represent the intellectual property of course instructors, third parties and/or the university which may not be disseminated or reproduced in any form for public distribution (e.g., sale, exchange, etc.) without the written permission of the course instructor. Course materials include all written or electronic documents and materials, including syllabi, current and past examination questions/answers, and presentations such as lectures, videos, slides, etc., provided by a course instructor. Course materials may only be used by students enrolled in the course for academic (course-related) purposes.

Published course readings (book chapters, articles, reports, etc.) available in "Blackboard" are copyrighted materials. These works are made available to students through licensed databases or fair use. They are protected by copyright law, and may not be further disseminated or reproduced in any form for distribution (e.g. uploading to websites, sale, exchange, etc.) without the permission of the copyright owner.

Follow these links for more information on Intellectual Property, Copyright, and Computer Acceptable Use.

21 Professorial Duties

It is important to note that teaching is one of the many duties that professors perform as part of their job responsibilities. In addition to teaching, professors perform research, advise graduate students, edit journals and review journal articles, serve on committees for the university and professional societies, travel to conferences to remain abreast of current developments and to present their results... to name just a few commitments.