

# Department of Bioengineering

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## **BioE 4030/L      *Applied Bioengineering Design*      *Spring 2021***

**Time, Location:**      Online      **Lecture:** Friday      10:10am – 11:00 am

312 Rhodes Annex      **Lab:** Variable (6 hours per week)  
**Design Lab Location:** Rhodes Annex 312

**Instructor:**      **Dr. John DesJardins**, Professor of Bioengineering  
**Office:** 204 Rhodes Annex Building (Mailbox: 401 Rhodes Building)  
Often in Rhodes 214 (The DEN)  
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**Office Hours:** By Drop-in or Appointment

**Co-Instructor:**      **Tyler Harvey, Ph.D.**, Lecturer, Dept. of Bioengineering  
**Office:** 313 Rhodes Research Center  
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**Office Hours:** By Appointment (<https://tgharve.youcanbook.me>)

**Class TA:**      **Timmy Samec**, Teaching Assistant  
**Office:** Rhodes 505  
**Phone, Email:** 570-751-3913, [tsamec@g.clemson.edu](mailto:tsamec@g.clemson.edu)  
**Office Hours:** By Appointment

**Meredith Owen**, Teaching Assistant  
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**Office:** Rhodes Annex 309, Rhodes 216  
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**Office Hours:** By appointment

**Davis Ferriell**, Teaching Assistant  
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**Class Text:**      **Optional:**  
Biodesign: The Process of Innovating Medical Technologies Authors:  
Yock, Zenios, Makower, Brinton, Kumar, Watkins, Denend, **Second  
Edition**  
ISBN-13: 978-1107087354, ISBN-10: 110708735X  
[http://www.amazon.com/Biodesign-Process-Innovating-Medical-Technologies/dp/110708735X/ref=dp\\_ob\\_image\\_bk](http://www.amazon.com/Biodesign-Process-Innovating-Medical-Technologies/dp/110708735X/ref=dp_ob_image_bk)

**Suggested Reference:**  
Design of Biomedical Devices and Systems, 3<sup>rd</sup> edition, Paul H. King,  
Richard C. Fries, Arthur T. Johnson, July 29, 2014 by CRC Press  
Textbook - 515 Pages - 87 B/W Illustrations

## Prerequisites

BioE4010

## Course Summary

In this course, student teams will work to complete a design cycle on a biomedical industry or clinically relevant design project. They will apply fundamental design theory principles and undergraduate bioengineering course content towards the realization of a final tested prototype. Students will be guided through a series of design gates (or reviews), from which clearly defined design materials will be produced, presented and evaluated. Documents and artifacts will be graded by the instructor and reviewed by mentors. Design gate meetings and presentations will be attended and assessed by a bioengineering faculty mentors.

## Grading

It is expected that students will each devote as many as 9 hours per week to the course. Your participation and design presentations will be assessed by the instructor, the TAs and faculty reviewers. As a design team, your work should show evidence of your teams' collective efforts. The final course grades will be weighted as described below.

Design Gates Meetings (5 of them, 5% each) (Group grades)	25%
Design DHF Documentation (Group grade)	57%
Final Design Paper (DHF #22 Group grade)	10%
Final DHF Organization and Design Wrap-Up/Turn-in (Group grade)	3%
Symposium Attendance and Poster (Individual/Group grade)	5%

A (90–100%), B (80–89.9%), C (70–79.9%), D (60–69.9%), F (<60%)

Most assignments will be distributed and turned in via BOX. Grades will be logged in Canvas. Questions regarding graded work must be re-submitted to the instructor in writing, turned in with the original graded work.

## Spring 2021 Undergraduate Class Regulations

Please insure that you have read and are familiar with the current Spring 2021 undergraduate class regulations. They can be found in the Syllabus Box folder.

## INSTRUCTIONAL MODALITY:

As of January 5th, this course is schedule to be taught online until further notice. Decisions about the options and modalities will be communicated to the students in a timely fashion. For now, a fully online modality with live lectures will be the default mode of instruction. Asynchronous content will also be available and assigned. If possible, in-lab access will be scheduled and allowed in accordance with university policies.

## Teams and Team Grades

Team participation is valued and evaluated in this class. A team should produce work equivalent to the number of people in that team. In other words, a team of 5 people needs to produce work worthy of 5 A's to each receive an A for that work. Significant failure of a team member to participate in group assignments should be brought to the attention of the instructor **immediately**. Unless otherwise noted, all group members will receive the same grade that is assigned to work submitted as a group. Teams can occasionally "take up the slack" for members that have unexpected, yet excused absences, but these occurrences should be

logged and relayed to the instructor, so that abuses do not occur. Unexcused absences are not permitted, and cannot be “covered” by teammates. Failure of all teammates to attend and participate in group meetings could result in a lower team score. Initial concern with teammate performance should be discussed as soon as possible with the instructor. Direct attempts will be made to mediate and resolve the problem.

## **CLASS POLICY – GATE ATTENDANCE**

### **GATES:**

- 1) All students are required to attend and participate in their Gate meetings.
- 2) Gates missed for documented illness, university or departmental approved reasons are acceptable, but they do not absolve the absent person from their responsibilities to the team. Your teammates should know if you will be there or not, and the team should agree on a plan to cover the materials that are assigned to you.
- 3) **For each single (1) unexcused absence from a formal team design gate presentation your individual final grade will drop by 10%. (NOTE: this will be a 0/100 for the individual 5% presentation grade, PLUS a 5% individual PENALTY for not attending.)**

### **LECTURES**

- 1) If neither the instructor nor a TA comes to class within the first fifteen minutes, students are authorized to leave, unless otherwise instructed to remain. Any assignments that were posted and/or emailed are still in force and should be followed regardless.
- 2) Gates missed for university or departmental approved reasons are acceptable, but they do not absolve the absent person from their responsibilities to the team.
- 3) You are welcome to let the instructor know if you will not be attending a class due to an excused absence. Class attendance is not required, but your presence might be missed by your team and the instructor.
- 4) There will be no logging of independent design lab hours.

### **Design Laboratory Use and Access:**

The department has given us dedicated access to an undergraduate design laboratory, located in Rhodes Annex 312. This lab is outfitted with design critical tools, instrumentation, supplies and materials. It can also serve as your team’s design team meeting space. This lab has keypad access for which you will receive the code. This laboratory is to be kept clean and orderly. All users of the lab are required to actively participate in cleaning the lab. Failure to keep up after yourself or your team will result in forfeiture of laboratory privileges. You will be required to complete safety training before you are allowed use of this facility. You will be required to sign off on any SOP’s that are needed to operate any of the equipment. Specific COVID-19 Policies are being set up for use of this lab space. These will be detailed in a separate document.

### **Academic Integrity**

“As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a ‘high seminary of learning.’ Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.”

The Honor Code for the College of Engineering and Science/Clemson University will be applied to individuals when these individuals are expected to complete tests, projects, and reports on their own, and to teams when these teams complete work together (<http://www.clemson.edu/cecas/current-students/honor-code.html>)

### **Reference Materials**

- Black, J.: Biological Performance of Materials (Dekker, NY, 1981)  
Ullman D: The Mechanical Design Process, 3rd Edition, ISBN-13 9780072373387

Flinn, RA, Trojan, PK: Engineering Materials and their Applications  
Fries, R.C., Reliable Design of Medical Devices. 1997  
Love, S.F., Planning and creating successful engineered designs: Managing the design process. 1986  
Dieter, G: Engineering Design: A Materials and Processing Approach  
<http://www.bmesource.org/>

### **Design Confidentiality**

Please be mindful of issues of confidentiality in all design projects and professional interactions. When in doubt, please review anticipated “out of department” interactions, collaborations, phone calls or conversations with the design instructor. As a rule, never discuss the “secret sauce” of your design project with other people, and if you talk to others about your project, only do so in generalities. Never share printed or digital documentation with anyone outside your design team without consulting with a TA or instructor. Again, when in doubt ASK THE INSTRUCTOR. Students that are considering internships, shadowing or full-time positions with outside companies or persons should be mindful of sharing anything about their design projects with these external entities. Again, don’t share “secret sauce”. If any external people or entities are interested to “learn more” about your project, please be discrete, and you can always refer them to the TA’s or instructor for more information.

### **UNIVERSITY ADVISED WORDING**

#### ***Specific COVID-19 related information:***

For a student who reports testing positive or is being asked to quarantine/isolate because of exposure to the virus, it will be up to the student to inform the instructor that they will be moving to online only instruction for at least the next two weeks. Students are directed to use the Notification of Absence link in Canvas to initiate this notification, which can be found under the “Help” button on the left navigation. (For courses where Canvas is not used, the direct link to the Notification of Absence form can be found through the Division of Student Affairs site.) Additional communication via email is encouraged; students should follow up with their instructor to develop a continued plan of study for each course. Students cannot be penalized in their grade for needing to move to online instruction.

#### ***Clemson University Title IX (Sexual Harassment) Statement***

Title IX Policy: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972.

The University is committed to combatting sexual harassment and sexual violence. As a result, you should know that University faculty and staff members who work directly with students are required to report any instances of sexual harassment and sexual violence, to the University’s Title IX Coordinator. What this means is that as your professor, I am required to report any incidents of sexual harassment, sexual violence or misconduct, stalking, domestic and/or relationship violence that are directly reported to me, or of which I am somehow made aware.

There are two important exceptions to this requirement about which you should be aware: Confidential Resources and facilitators of sexual awareness programs such as "Take Back the Night and Aspire to be Well" when acting in those capacities, are not required to report incidents of sexual discrimination.

Another important exception to the reporting requirement exists for academic work. Disclosures about sexual harassment, sexual violence, stalking, domestic and/or relationship violence that are shared as part of an academic project, a research project, classroom discussion, or course assignment, are not required to be disclosed to the University's Title IX Coordinator.

This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Ms. Alesia Smith is the Executive Director for Equity Compliance and the Title IX Coordinator. Her office is located at 223 Holtzendorff Hall, phone number is 864.656.3181, and email address is [alesias@clemson.edu](mailto:alesias@clemson.edu).

### ***Accessibility Policy:***

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing [studentaccess@lists.clemson.edu](mailto:studentaccess@lists.clemson.edu), or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: <http://www.clemson.edu/campus-life/campus-services/sds/>.

Requests for SDS accommodations must be submitted 1 week prior to expected implementation.

### ***COVID-19 Related Expectations for Face Coverings to Include in Syllabus***

Specific COVID-19 related information for in-person classes:

While on campus, face coverings are required in all buildings and classrooms. Face coverings are also required in outdoor spaces where physical distance cannot be guaranteed. Please be familiar with the additional information on the Healthy Clemson website, such as the use of wipes for inperson classes. If an instructor does not have a face covering or refuses to wear an approved face covering without valid accommodation, students should notify the department chair. If a student does not have a face covering or refuses to wear an approved face covering without valid accommodation, the instructor will ask the student to leave the academic space and may report the student's actions to the Office of Community & Ethical Standards as a violation of the Student Code of Conduct. If the student's actions disrupt the class to the extent that an immediate response is needed, the instructor may call the Clemson University Police Department at 656-2222.

### ***Animal Use***

If your course includes the use of animals, the following policy and link must be included in the syllabus: <http://www.clemson.edu/research/compliance/iacuc>

### ***Human Subjects***

Any human subjects research should comply with campus IRB regulations, see: <http://www.clemson.edu/research/compliance/irb/>

### ***Emergency Procedures***

Clemson University is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

- A. Emergency procedures have been posted in all buildings and on all elevators. Students should review these procedures for their own safety and understanding.
- B. Ensure you are signed up for emergency alerts  
(<https://www.getrave.com/login/clemson>)
- C. Download the Rave Guardian app to your phone  
(<https://www.clemson.edu/cusafety/cupd/rave-guardian/>)
- D. Learn what you can do to prepare yourself in the event of an active threat  
(<http://www.clemson.edu/cusafety/EmergencyManagement/>)