

## **2.75J (H) 6.525J(H), 2.750J (H), 6.025J (UG CI-M AUS) Medical Device Design - Fall 2016 Syllabus**

Units: 3 - 0 - 9

Prerequisites: 2.008, or 6.101, or 6.111, or 6.115, or 22.071, or permission of instructor

Updated: 24 November 2016

This course provides an intense project-based learning experience around the design of electrical, mechanical and electro-mechanical medical devices. Course content will cover the design process, project management, and fundamentals of mechanical and electrical circuit and sensor design. Students will work in small teams to execute a substantial term project, with emphasis placed upon developing creative designs via a deterministic design process that are optimized by analytical techniques. This is a communication intensive course.

To take this class, all students are required to read this syllabus in its entirety and print and sign the last page indicating they have read and understood all the requirements, and turn it in second class.

### **Teaching Staff**

<b>ME Instructor</b>	<b>EE Instructor</b>	<b>Co-Instructor</b>	<b>Comm. Instructor</b>	<b>EE TA</b>
Prof. Alex Slocum Room: 3-445 Phone: 253-0012 <a href="mailto:slocum@mit.edu">slocum@mit.edu</a>	Gim P. Hom Room: 38-644 Phone: 324-3373 <a href="mailto:gim@mit.edu">gim@mit.edu</a>	Dr. Nevan Hanumara Room: 3-470 Phone: 258-8541 <a href="mailto:hanumara@mit.edu">hanumara@mit.edu</a>	Dave Custer Room: 24-611 Phone: 253-2872 <a href="mailto:custer@mit.edu">custer@mit.edu</a>	Jason Yang Room: 38-229 <a href="mailto:jasony@mit.edu">jasony@mit.edu</a>
<b>MechE TA</b>	<b>Admin. Guru</b>	<b>Mentor</b>	<b>Mentor</b>	<b>Mentor</b>
Thomas Cervantes Room: 3-443 <a href="mailto:tmcneb@mit.edu">tmcneb@mit.edu</a>	Irina Gaziyeva Room: 3-461 Phone: 253-5592 <a href="mailto:igaziye@mit.edu">igaziye@mit.edu</a>	Dr. Sandy Campbell Room: 3-438 Phone: 258-8114 <a href="mailto:sandyabcd@mac.com">sandyabcd@mac.com</a>	Dr. Daniel Teo Room: 3-443 <a href="mailto:dteo@mit.edu">dteo@mit.edu</a>	Christina Chase Room: E40-160 Phone: 324-4048 <a href="mailto:cchase@mit.edu">cchase@mit.edu</a>
<b>Mentor</b>	<b>Mentor</b>	<b>Mentor</b>	<b>Mentor</b>	
Maulik Majmudar, MD <a href="mailto:majmudar@partners.org">majmudar@partners.org</a>	Jay Connor, MD <a href="mailto:jcmdhandsurg@comcast.net">jcmdhandsurg@comcast.net</a>	Dr. Julio Guerrero <a href="mailto:jguerrero1000@gmail.com">jguerrero1000@gmail.com</a>	Dr. Tyler Wortman <a href="mailto:wortman@mit.edu">wortman@mit.edu</a>	

**Website:** <http://web.mit.edu/2.75/>

**Lecture:** **Monday & Wednesday 1:00 - 2:30 PM in 3-270**

Note: 3-270 is also reserved Monday & Wednesday 12:00 – 1:00 for preparation, team meetings, etc. (TBC 9/12)

Teams looking for spur of the moment meeting locations are recommend to use:

<https://classrooms.mit.edu/classrooms/#/quickroom>

This class seeks to emulate real world product development effort, with students working in fast paced, professional R&D teams. Attendance is a must at all lectures: Blank looks when issues are raised in design reviews indicate that the student was not in lecture/not paying attention/not doing the reading and will be reflected accordingly in the student's grade. (In real life this puts you at the top of the list to be fired/replaced/outsourced). This big plus is that projects often result in published papers and sometimes as real products, which is a huge boost to one's resume!

In addition to lectures listed on the calendar, special industry guest lecture sessions may be offered.

### **Readings, Quizzes**

In order for your projects to succeed, it is critical to learn the principles presented in the readings and lectures. Hence short (5 - 10 min) in-class quizzes will be given at the beginning of lectures to help keep folks focused and sharp! Questions will draw upon the assigned readings, which should be done in advance, and as well as highlights of the preceding lecture.

Quiz grades will range from 0 (absent physically or mentally) → 5 or 10 (got it!).

There are no excused quizzes, however, the lowest two will be dropped. This parallels a work environment where occasional absences are excused, but makeups don't exist.

In addition, lectures will sometimes have "FUNZEES!" announced which are short real time problems the class is asked to do (and turn in at end of class) that the lecturer will then complete at the board. This helps us to gage if the message getting transmitted and received. Again, the "grade" will be a 0, 5, or 10.

## Team Term Project

Students will work in small teams (3-5 people) to execute a substantial project, spanning the entire term on a health-focused topic.

*The goal of the class project is to rapidly and efficiently develop a proof-of-concept prototype device that addresses a real need. Prototypes are demonstrated during the final presentation and documented in a written paper.*

To help maintain a fair pace consistent with the units for the class, each week tasks for each person to complete before the next meeting will be set and recorded on paper. At the next meeting progress made by each team member will be recorded by the team mentor. This will help all members stay focused, ensure work balance between team members, and help achieve grading fairness.

**Possible project topics will be presented the second week of class and attendance at the project topic presentations is mandatory.**

Most of these projects will be proposed by members of the local clinical community. They have been selected competitively to present and are eager to work with you! The clinicians have committed to being accessible and are ready to engage with you substantially on a regular basis and truly be part of the team.

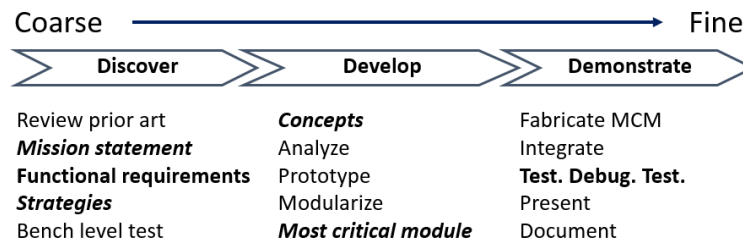
***Please understand that given the project-clinician relationship, small teams and aggressive schedule, signing up for a project constitutes an implicit agreement NOT to drop the class.***

Because full participation in the project is integral to the class, listeners cannot be accommodated. Students CANNOT take 2.75 and another major lab/product development class in the same semester, nor may students take another class that overlaps time wise with 2.75. (2.75 is routinely oversubscribed and there are plenty of other students willing to fully commit.)

Project sign-up will begin after the presentations. Students will be asked to indicate their top choices. Students should sign up for a project based on their passion for the idea, NOT based on what their friends are doing. This is a great opportunity to make NEW friends and future professional connections. Staff will facilitate team formation as needed once everyone has signed up for their top three projects, and given the wide array of student interests and expertise there have been few past difficulties in satisfying everyone.

Teams will follow a deterministic design process which fosters creativity, but eschews shoot-from-the-hip design. (This is NOT a hackathon class.) The project process is roughly broken up into thirds:

1. **Discover** – Problem presentation by client, team formation, detailed problem understanding, investigation of prior art, definition of functional requirements and exploration of possible solution *strategies*.
2. **Develop** – With a specific *strategy* selected, specific *concepts* are developed, analyzed and tested. The design is divided into modules and attention focused on the *most critical*.
3. **Demonstrate** – The entire system is fabricated, integrated and tested. Proper documentation is an important, oft shortchanged, step that begins the *design history file*, essential for any quality product and especially with medical.



*Three phase, 14 week deterministic design process*

Throughout the deterministic process, all decisions must be backed up by appropriate analysis, experiments, and [PREP – Peer Review Evaluation Process](#), where each person keeps a detailed design notebook and peers review each other's notebooks.

Failure is defined as a non-working prototype and no idea why it failed. Failure is *NOT* defined as a prototype that functions, but conclusively demonstrates that a concept will not meet clinician requirements. The former is lack-of-focus and the latter is research.

As part of this process teams are expected to meet, with a minimum frequency of every two weeks, with their project proposer at a mutually convenient time. Look upon them as bringing the clinical/need expertise to the project and you the technical talent! You each have separate, but equally important skills.

## Weekly Team Mentor Meetings

Each team will be assigned a mentor who will meet with student teams weekly for an hour to review progress, brainstorm/solve project design problems and locate resources. To maximize productivity and minimize frustration, it is thus *critical* that teams be prepared with a discussion agenda and that each student *must* bring their design notebook, which has been peer reviewed by teammates *before* the meeting!

Every week, one or more overall project milestones will be due and reviewed with mentors. These should be posted to the team's secure Wiki page in advance of the meeting. At the end of each mentor meeting, teams will together identify and assign the action items for the following week and record them in their notebooks. It is important to realistically estimate what can be accomplished and plan accordingly.

As stated above, and restated here to emphasize the importance, *to help maintain a fair pace consistent with the units for the class, each week tasks for each person to complete before the next meeting will be set and recorded on paper. At the next meeting progress made by each team member will be recorded by the team mentor.*

Project proposers do not need to attend weekly mentor meetings, however they are welcome on an ad hoc basis. Additionally, your team mentor (class staff) can help teams to realize productive interactions with their project proposer.

## Teamwork

Team work is central to functioning of this class and any modern engineering endeavor and it is expected that students will work together in a *safe, professional, and collegial manner* as defined in MIT's policies and procedures, especially 9.0 "Relations and Responsibilities Within the MIT Community," <http://web.mit.edu/policies/9/>. During the first weeks of team work, identify any perceived problems with your team's dynamics promptly, and bring them to the attention of your team members and/or course staff, who will help resolve issues. This process itself is an invaluable part of education, because in the real world, especially internationally where all business happens these days, there are no "safe spaces" to retreat to. We can help 1/😊 = 😊.

## Peer Evaluations & Midterm Review

A midterm, anonymous peer review will be conducted and the results reviewed by the course staff. Grades, as an indicator of performance thus far, will then be provided to each student along with individual, constructive feedback. Consider this a professional performance review – it does not define your final grade but can help with focus and direction if needed.

*At the end of the course, team members will have the opportunity to formally review each other and your combined ratings can be used to adjust your grade by up to a full letter.*

## Labs

At the onset of the course there will be two lab assignments:

1. Design, build, and test a kinematic coupling (KC) which demonstrates the principles of exact constraint design, important for any mechanical device.
2. Design, build, and test a "Fitbit" heart rate monitor [technically known as a photoplethysmogram (PPG)] and an ECG monitor which demonstrate basic electronics principles and lab skills necessary in the EE design process.

The objective of both labs is to help familiarize students with knowledge, tools, equipment, and hands-on skills needed for R&D.

The Hobby Shop and lab space in EECS will be made available; safety training and a signed acknowledgment is required for both. There are many students from different departments, and students are encouraged to use maker spaces available to them. There are no formal manufacturing labs set aside for this course, and no formal lab space—teams must find their own just as if they were a student team with their own idea they wanted to develop and then start a company... Be resourceful!

Standard materials for the two lab assignments will be provided, though students are welcome to use their own supplies and be creative! Because good design demands a process (measure twice, cut once) the labs will be completed in two parts: First a written proposal with engineering drawings must be submitted, and then following build and test, a brief lab report and in-class demonstration. Both can also be posted on your personal websites, and in the past they have had a very positive impact on student's ability to get the good job they were hoping for. Accordingly labs will count as substantial portion of the course grade.

## Prototyping & Budget

Each team will have a budget of about \$4K (MIT overhead is not included in this amount) net to develop, prototype, and test their solution. Legitimate expenses include: components, machine shop services (must get an estimate for cost of job), local travel (mileage), etc. You cannot charge food under any circumstances.

Your mentor will guide you in efficient use of your budget. Remember, your time has value, thus there is a tradeoff between your fabricating and sourcing outside components. Remember the three D's: Deliverables – Deadlines – Dollars!

Irina Gaziyeva will administer team accounts and oversee purchasing procedures and guidelines. Students will be asked to use standard class ordering procedures and are *required to provide all order confirmations and packing slips to Irina Gaziyeva*. If you buy something local you need to use the MIT tax exempt number, as you cannot be reimbursed for sales expenses. Any purchasing questions, ask Irina! This is an MIT requirement for audit purposes. *No packing slip, no grade!* Teams are required to track their expenses with a page on their Wiki.

The course staff has many contacts with helpful vendors that are able to accommodate the needs of prototype projects (The cheapest vendor is not always the best ...) and we are happy to have new suggestions. When in doubt, ask!

Many teams will want to fabricate their own parts, particularly during the initial project stages. Some available resources include:

[MIT Hobby Shop](#) – Semester membership provided to students in 2.75q, safety training required

[Edgerton Center Student Shop](#) (44-023) – Open to all MIT students, safety and machine operation training required via a special course as required by the shop.

[MakerWorks](#) - LMP (35-122) – Restricted to Mechanical Engineering students (and students in this class), safety training required

[EECS Lab](#) (38-601, 38-530) – bench space, instruments, tools, and proto boards available. Safety form signature required.

Wet lab access (5-026) - by special arrangement only on a case by case basis

[Mobius](#), from the Innovation Initiative's Project Manus website, can help you locate and access some of the campus' 45 major maker spaces.

Teams are responsible for keeping all workspaces clear and returning equipment to the proper storage otherwise access will be revoked. As each project is different, staff will work individually with teams to ensure that they obtain the necessary resources. Teams are welcome to use any other lab / fabrication facilities that they have access to.

*Note: At no time can animal tissue be used in non-bio workspaces.*

*If there are any questions / doubts regarding fabrication or safety - please ask the course staff.*

## **Documentation**

Students are expected to maintain bound design notebooks with sketches, calculations, pasted in pictures, etc., which are informally reviewed during meetings and factor into grading. However, their primary function is to document the design process, especially with regards to building a design history file and establishing inventorship. The instructors also keep notebooks which they update during meetings and presentations and use them to help manage the teams and document their own contributions.

Other documentation, in addition to the design notebook, **MUST** be posted to the class (secure) Wiki, which will document the development and progress of your project. This Wiki will be viewable by other teams and the staff and will be consulted during class. It is especially important for grading, because if the Wiki is not up to date, we cannot determine if any work was actually done and by who!

Teams will write a publication-quality final paper, which they are then encouraged to submit to a conference or journal; many have been selected for publication in the past (see the course website). Write early and write often: It is critical to document (write) as-you-go and in order to prevent teams from waiting until the last minute, sections of the paper will be due through the course and posted to the Wiki. Therefore, ideally by the end of the term only editing will remain. In addition to the paper, teams will be expected to turn in their PowerPoint presentations and a one-page executive summary project description.

## **Intellectual Property**

IP is often generated in this course, and thus it is essential that all team members (clinicians and instructors included) keep bound, signed, dated and witnessed design notebooks to record individual contributions. Not everyone will necessarily be an inventor, but the more engaged a team member is the greater the likelihood that he or she will contribute specific features (claims) to the IP and, thus, be formally considered an inventor. Whether or not you are an inventor has no effect on your grade, because you can be a person who helps reduce an idea to practice and thus be a critical team member and journal paper author even though you might not in the legal sense be an inventor. IP and any royalties will be shared amongst the inventors and their institutions. IP created by students in an MIT course is considered property of the students; however the inventors may decide it is best for it to be assigned to the MIT Technology Licensing Office for prosecution. If a staff member is an inventor, then MIT policy states that the IP belongs to MIT and inventors share any future royalties in accordance with [MIT TLO policy](#).

## Communication

2.75 is a graduate course that requires students to communicate as professionals (weekly design reviews and a term paper of journal quality). 2.750 is a CI-M course for undergraduates and hence requires significant development/demonstration of communication skills, which is also excellent professional practice for graduate students. The communication requirements for both graduates and undergraduates are actually equivalent and are really useful, because they are all done in the context of the team's project. They include:

- Weekly peer review of each other's work in design review meetings (with the instructors).
- 15 minute presentation by the team to the class of top solution strategies ("best" selected if possible).
- 15 minute presentation by the team to the class of top solution concepts ("best" selected if possible).
- 15 minute presentation by the team to the class of top solution designs ("best" selected if possible).
- 20 minute final presentation by the team to the class, clinicians and invited visitors
- The team is responsible for submitting a final report in the form of a journal article suitable for the [ASME Journal of Medical Devices](#) or [ASME Journal of Mechanical Design](#) or [IEEE Transactions on Biomedical Engineering](#). (Recommended: 20 pages double-spaced plus figures; details go in Appendices.) An "A" grade project is one that is presented in form and content that is actually ready to be submitted to a peer-reviewed journal. *Many of the final reports are either published in a journal or at a conference and a patent application may be filed.*

Following the final presentations and filing of any patents that may be required, deliverables (or a subset thereof) may be posted to the course website to serve as a record and example for future teams.

### Course e-mail lists

*Students agree that these e-mail lists will be strictly limited to course use only.*

2.75-2016@mit.edu                      Contacts the entire course students and staff  
 2.75-staff@mit.edu                      Contacts the course teaching staff

Teams are welcome to create their own internal e-mail lists with or without their clinician; please post them to the Wiki.

### Recommended Texts

1. "FUNdaMENTALS of Design", A.H. Slocum, posted to the course website. This is a MUST download and read (as well as the design spreadsheets). Carefully reading and comprehending this design knowledge will lead the greatly enhanced design happiness in the class and in your professional design career.
2. Precision Machine Design, A.H. Slocum, for the serious deep thought machine designer. Copies are available from Irina at the author price .
3. "Fundamentals of Electronics" Lectures, posted on course website.
4. "The Art of Electronics 3<sup>rd</sup> Edition", Horowitz and Hill, Cambridge University Press.

### Grading

The course grade is based on: A = 90-100; B = 80-90; C = 70-80

Term Project – Team Grade Execution of the design process Meeting scheduled milestones Use of time and \$ Quality of design & execution (details & execution)	45%
Formal Communications Team Presentations Final Paper	15%
Individual Performance Contributions to project (monitored via weekly check offs) Use of lab notebook PREP effectiveness	15%
Preparation: In-Class Short Quizzes and FUNZEES	15%
Individual EKG lab & KC Labs	10%
Total:	100%

## **Important Final Note on Grades**

This is an advanced design course for professionals! Therefore, as in industry, we will not be giving detailed weekly grade feedback nor a detailed midterm expected grade. We have quizzes, conduct a mid-term review and often assign project action items to individuals. Together, these should provide a good sense of your progress and instructors are available to provide feedback as needed.

Work hard and efficiently and you will do great! Remember—the grade is not nearly as important as learning a design process and developing a prototype and documenting what YOU did with the team to bring it to life, so you can be proud of and show to potential employers. Many past 2.75 students have told us that it was going over their design notebook or their website with an interviewer that led to their good job.

Post semester, should there be any grade concerns, students must present their design notebook for review, be prepared to discuss all the materials covered in the class and then accept that their grade may go up or down.

## **Student Disability Services:**

MIT values an inclusive environment. If you need a disability accommodation to access this course, please communicate with us (the faculty/teaching staff) early in the semester. If you have your accommodation letter, please meet with the faculty so that we can understand your needs and implement your approved accommodations. If you have not yet been approved for accommodations, please contact Student Disability Services at [uaap-sds@mit.edu](mailto:uaap-sds@mit.edu) to learn about their procedures. We encourage you to do so early in the term to allow sufficient time for implementation of services/accommodations that you may need.

**Student Support Services:** *If you are worried about (or do) fall behind...*

If you are dealing with a personal or medical issue that is impacting your ability to attend class, complete work, or take an exam, please discuss this with [Student Support Services](#) (S3). The deans in S3 will verify your situation, and then discuss with you how to address the missed work. Students will not be excused from coursework without verification from Student Support Services. You may consult with Student Support Services in 5-104 or at 617-253-4861. Also, S3 has walk-in hours Monday-Friday 9:00 - 10:00am.

Graduate Students: Please reach out to the [deans for personal support](#) in the Office of the Dean for Graduate Education.

## **Other Concerns**

If you have significant travel or personal needs that you believe may impact your ability to work effectively in a fast paced team, please be aware that 2.75 may not be a good choice. If you have a concern, please meet with Prof. Slocum to discuss alternatives, such as UROPs. Unfortunately, due to space constraints, listeners cannot be accommodated, however 2.75 materials are on line and can be used for self-study.

*We are committed to making this a positive learning experience for all of us, so please come and talk to us.*

## Fall 2016 Schedule

Please note that the schedule may be modified as circumstances demand during the course of the term.

Wk #	Start Date (Mon)	Monday	Wednesday	Tasks & Project Milestones
1	9/5	No Class	<ul style="list-style-type: none"> <li>Welcome</li> <li>Course introduction</li> <li>Deterministic design process</li> <li>Communications intro (Dave)</li> <li>FUNdaMENTALS Topic 2 (Alex)</li> <li>Intro to KC lab</li> </ul>	<ul style="list-style-type: none"> <li>Install Solid Works and practice as needed</li> <li>Fill team member pre-survey - link on Wiki</li> <li>Begin reading course material - Real engineers prepare for known forthcoming meetings, events, design reviews, etc...!</li> <li>Sign up for <a href="#">Hobby Shop</a> training - link on <a href="#">Wiki</a></li> <li>Review and sign Hobby Shop form in advance</li> </ul>
2	9/12	<ul style="list-style-type: none"> <li><b>Clinician Presentations</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Clinician Presentations</b></li> </ul>	<ul style="list-style-type: none"> <li>Team formation open Thursday 15 - 8 AM – 6 PM - link on <a href="#">Wiki</a></li> <li><b>Teams Announced</b> (e-mail)</li> <li>Hobby Shop safety training: Monday 3 – 4 PM; Tuesday, Friday 4 – 5 PM</li> </ul>
3	9/19	<ul style="list-style-type: none"> <li>Product development process (Julio)</li> <li>Lit and Patent Search (Angie, MIT Libraries)</li> <li>Team dynamics (Dave)</li> <li><b>KC Proposal Due</b></li> </ul>	<ul style="list-style-type: none"> <li>FUNdaMENTALS Topics 3, 11 (Alex)</li> <li>Teams schedule regular meeting time with mentor</li> </ul>	<ul style="list-style-type: none"> <li>Teams formed and weekly meetings scheduled</li> <li>Begin to research prior art including products, literature and patents</li> <li>Document literature and prior art search findings (include references)</li> <li>Extract functional requirements</li> <li>Begin to research strategy options</li> <li>Team <a href="#">Wikis</a> functional</li> </ul>
4	9/26	<ul style="list-style-type: none"> <li>FUNdaMENTALS Topics 4, 6, 10 (Alex)</li> <li><b>EE PreLab Announced</b> (Gim)</li> <li><b>ECG Lab Announced</b> (Jason)</li> <li>Communication (Dave)</li> </ul>	<ul style="list-style-type: none"> <li>EE Design Process (Gim)</li> <li>Questions on EE or ECG Lab</li> <li>Mission Statements (on board)</li> </ul>	<ul style="list-style-type: none"> <li>Create mission statement</li> <li>Top 3 strategies selected, and described with FRDPARRC table(s)</li> <li>KC Fabrication begun</li> <li>Review and sign EECS lab safety form</li> </ul>
5	10/3	<ul style="list-style-type: none"> <li><b>Teams' Strategy Presentations</b> (begin with your mission statement)</li> </ul>	<ul style="list-style-type: none"> <li><b>Teams' Strategy Presentation</b> (post slides to Wiki)</li> <li><b>Prelab Writeup Due</b> (upload)</li> <li><b>ECG Proposal Due</b> (upload)</li> </ul>	<ul style="list-style-type: none"> <li>Conduct bench level experiments to help select strategy</li> </ul>
6	10/10	<ul style="list-style-type: none"> <li><b>Columbus Day – Holiday</b></li> <li>Complete Peer Evaluation</li> </ul>	<ul style="list-style-type: none"> <li>EE Design Process (Gim)</li> <li><b>KC Writeup Due &amp; Expo</b> (upload, 30 min)</li> </ul>	<ul style="list-style-type: none"> <li>Best Strategy Selected with its FRDPARRC table complete</li> <li>Design and make sketch models / experiments</li> <li>EKG Fabrication begun</li> <li>Draft of <i>introduction</i> section of 2.75 final paper/journal article</li> <li>Peer Evaluation #1 completed</li> </ul>
7	10/17	<ul style="list-style-type: none"> <li>Human Centered Design – Aaron Ross, MGH Ergonomist</li> <li>3D Printing: Methods &amp; DFM considerations - Sean O'Reilly, <a href="#">3D Printsmith</a></li> </ul>	<ul style="list-style-type: none"> <li>EE Design Process (Gim)</li> <li>Communications (Dave)</li> </ul>	<ul style="list-style-type: none"> <li>Develop concepts, run bench level experiments</li> <li>Report experimental results</li> <li>Top 3 Concepts selected, and described with their FRDPARRC tables completed</li> <li>Create detailed schedule to completion</li> <li>Draft of <i>background</i> section of 2.75 final paper/journal article</li> </ul>

8	10/24	<ul style="list-style-type: none"> <li>• <b>Teams' Concept Presentations</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Teams' Concept Presentations</b> (Post slides to Wiki)</li> <li>• <b>ECG Writeup Due</b></li> </ul>	<ul style="list-style-type: none"> <li>• "Best concept" should be selected, and good sketch model done and tested so as to enable "real parts" to be made</li> <li>• Create solid model of "Best Concept"</li> </ul>
9	10/31	<ul style="list-style-type: none"> <li>• FUNdaMENTALS Topics 7, 8 (Alex)</li> <li>• (Costumes appreciated)</li> </ul>	<ul style="list-style-type: none"> <li>• <del>Xenco Medical Case Study – Jason Haider</del></li> <li>• FUNdaMENTALS Topics 9 (Alex)</li> <li>• Midterm grade review</li> </ul>	<ul style="list-style-type: none"> <li>• Most Critical Module (MCM) engineering complete</li> <li>• Begin engineering of other modules</li> <li>• Final paper abstract, first paragraph &amp; structure outline</li> </ul>
10	11/7	<ul style="list-style-type: none"> <li>• FUNdaMENTALS Topics 11 (Alex)</li> </ul>	<ul style="list-style-type: none"> <li>• EE Design Process (Gim)</li> <li>• Intellectual Property – Ben Rockney, <a href="#">MIT TLO</a></li> </ul>	<ul style="list-style-type: none"> <li>• MCM complete and demonstrable (ready for the Design Reviews)</li> <li>• Prepare to send remaining parts out for fabrication!</li> </ul>
11	11/14	<ul style="list-style-type: none"> <li>• <b>Teams' in-class Design Reviews</b> (last chance for class feedback ...)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Teams' in-class Design Reviews</b> (last chance for class feedback ...)</li> </ul>	<ul style="list-style-type: none"> <li>• Engineering for other modules complete</li> <li>• Send parts out for fabrication! (later and they will not arrive on time)</li> <li>• Final manufacturing begun</li> <li>• Draft of <i>design/methods</i> section of 2.75 final paper/journal article; the <i>methods</i> draft can be in the form of a testing proposal</li> </ul>
12	11/21	<ul style="list-style-type: none"> <li>• Staff help session</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Happy Thanksgiving</b></li> </ul>	<ul style="list-style-type: none"> <li>• Final manufacturing complete</li> <li>• Integration of modules started</li> </ul>
13	11/28	<ul style="list-style-type: none"> <li>• Xenco Medical Case Study - Jason Haider (rescheduled)</li> <li>• Course 2 senior survey</li> <li>• Communications survey</li> <li>• Staff help session</li> </ul>	<ul style="list-style-type: none"> <li>• Reimbursement 101, Charles Mathews, <a href="#">Boston Health Care</a></li> <li>• Med school war stories (Tom)</li> <li>• Staff help session</li> </ul>	<ul style="list-style-type: none"> <li>• Prototype complete &amp; ready for testing</li> <li>• Presentation dry run</li> <li>• Final paper draft</li> </ul>
14	12/5	<ul style="list-style-type: none"> <li>• Team working session</li> <li>• Fabricate to finish!</li> </ul>	<ul style="list-style-type: none"> <li>• Team working session</li> <li>• Fabricate to finish!</li> </ul>	<ul style="list-style-type: none"> <li>• Testing complete and documented, tweaked &amp; ready to present</li> <li>• PowerPoint slide deck</li> </ul>
15	12/12	<p>Staff in classroom during class hours for presentation dry runs</p> <p><b>Wednesday 14 December*</b></p> <p><b>Presentations loaded on class laptop by high noon. See Irina in 3-461</b></p> <p><b>Final Presentations:</b></p> <p>Room 3-270</p> <p>6:00 – 6:45 Yummy dinner (for student presenters only)</p> <p>6:45 – 7:00 Doors open</p> <p>7:00 – 10:30 Presentations</p> <p>(Note 2.009 presentations on Monday night)</p>		<p><u>Final Deliverables</u> – Uploaded to <a href="#">Wiki</a>, by Monday 19</p> <ul style="list-style-type: none"> <li>• Final presentation in PDF and PowerPoint</li> <li>• Paper following a known Journal format in PDF and Word</li> <li>• One page concise description in PDF and Word</li> <li>• Any video media that you may have created</li> <li>• Complete Peer Evaluation #2</li> <li>• Final Wiki update for archival purposes</li> </ul>
	12/19	<b>Done!</b>		Whew!

\*If the final presentations conflicts with your regularly scheduled evening class you MUST attend that class. In this case, missing (or arriving late to the) the final presentations is acceptable. Be sure to advise the instructors and work with your team to ensure that you pull your weight on preparing the final presentation and final deliverables.



**Student Acknowledgment 2.75 2016 Syllabus**

**I have read the 2.75 syllabus in its entirety and by my signature below agree that I have read the syllabus and understand and agree to all the requirements for this class:**

**Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_