Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
• Submit original form and attachments •

1. This request is submitted by the Department of ____________
   (BMEN)

2. Course prefix, number and complete title of course: ____________
   (BMEN 608 Optical Diagnostic and Monitoring Principles)

3. Change requested
   a. Prerequisite(s): From: ___________________________ To: ___________________________
   b. Withdrawal (reason): ___________________________
   c. Cross-list with: ___________________________
   d. Change in course title and description. Enter complete current course title and current course description in item 4; enter proposed course title and proposed course description in item 5.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 6. Attach a course syllabus.

4. Complete current course title and current course description:
   Engineering design principles of optically based monitoring and diagnostic modalities; emphasis on generating quantitative descriptions of biochemical and biophysical interactions of optic and fiber optic systems as applied to medical diagnostics and sensing.

5. Complete proposed course title and proposed course description (not to exceed 50 words):
   Principles of optical spectroscopy, including absorption, fluorescence and scattering spectroscopy; emphasis on understanding how light interacts with biological samples and how these interactions can be optically measured, quantified and used for medical diagnosis and sensing.

6. a. As currently in course inventory:
   
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   b. Change to:
   
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   Approval recommended by: ____________________________
   ____________________________ 1/25/08

   Head of Department

   Chair, College Review Committee
   ____________________________ 12-2-08

   Dean of College
   ____________________________ 12-2-08

   Dean of College
   ____________________________ 1/25/09

   Submitted to Coordinating Board by:
   ____________________________
   ____________________________
   Associate Director, Curricular Services

   Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
   Curricular Services – 10/08
To Whom It May Concern:

BMEN 608 Optical Diagnostic and Monitoring Principles- Change in course description.

The proposed course description provides clearer and more detailed information about the topics covered in the course. The updated course description is intended to aid prospective students in evaluating their interests in the courses offered at Texas A&M and to aid current students with their decision as to whether or not to enroll in the course, according to their interests and previous experience.
Bmen 608 – Section 600 (Fall 2008)

Optical Diagnosis and Monitoring Principles

Instructor: Javier A. Jo
Email: javierjo@tamu.edu
Phone: 979-458-3335
Office Hours: Thursday 9:30-11:30 AM Office: 335H Zachry
By appointment (email)

Class schedule: Tue/Thu 8:00-9:15 AM Classroom: 128DZachry

Description: Fundamentals of light-matter interactions and main optical spectroscopic methods used for their quantification. Emphasis will be placed on light-tissue interactions, their modeling and experimental assessment, and optical spectroscopy applications in biomedicine and biosensing.

Class Credits: Three Credits (3-0).
Prerequisites: MATH 308 and PHYS 208.

Reference: No textbook is required; however, the following non-exclusive list of reference is suggested.

Books:

Professionals Journals
2. *Applied Optics: Optical Technology and Biomedical Optics*, published by the Optical Society of America
3. *Optics Letters*, Published by the Optical Society of America
4. *Optics Express*, on line publication by optical society of America (http://www.opticsexpress.org/)

Learning Outcomes:
At the end of the semester, you will be able to:

- Explain the basics of light-matter interactions and how they can be quantified using optical spectroscopy
- Understand the basics (principles, instrumentation, data analysis and interpretation) of the main optical spectroscopic methods.
- Discuss current biomedical applications of optical spectroscopy.
- Select a method suitable to address specific biomedical/biosensing problems.
- Use fluorescence spectroscopy/imaging instrumentation.
- Read and critically review scientific papers.
- Define and plan a research project considering time and budget constraints.
Assessment and Evaluation:

- **The fundamentals behind light-matter interaction and the main optical and the main optical spectroscopic methods** studied will be discussed during lectures. Knowledge of the different methods (theory) and the steps necessary for their implementation will be evaluated through quizzes and mid-term exam.

- **Hand-on experience on fluorescence spectroscopy and imaging** will be provided through two lab sessions in these topics. Practical knowledge will be evaluated through the lab report, in which lab measured results will have to be professionally summarized and interpreted.

- Relevant biomedical and biosensing applications of the spectroscopic methods presented in class will be covered by reviewing scientific papers in specific topics. Knowledge of state-of-the-art applications and main optical methods will be evaluated based on student topic class presentation, papers class discussion and written reviews.

- Problem definition and planning skills are essential for a successful carrier in science and engineering. The term project of the course aims to develop such skills, and it will be evaluated based on the term paper and project presentation.

### Grading Policy

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<tr>
<td>Quizzes</td>
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<tr>
<td>20 minutes of class time. Each quiz will cover a number of learning units</td>
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<tr>
<td>Mid-term Exam</td>
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<td>60 minute comprehensive exams. The instructor will notify the students about the topics to be evaluated</td>
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<td>Lab Reports</td>
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<tr>
<td>Lab sessions on fluorescence spectroscopy/imaging will be evaluated based on the report/discussion of experimental results.</td>
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<tr>
<td>Topic Lecture and Paper Reviews</td>
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<td>Each student will present at least one lecture on an assigned topic and lead the discussion of relevant papers. Individual paper reviews discussed in class will be also evaluated.</td>
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<tr>
<td>Term Project/Paper</td>
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<tr>
<td>A project in a topic relevant to this class will be chosen upon the instructor approval. Project evaluation will be based on: term paper and peer/instructor class presentation evaluation.</td>
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<td><strong>Total</strong></td>
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The final weighed average of each student will be calculated based on the indicated grade distribution. The letter grade will be assigned by the following criterion:

\[ A>=90; \quad 80=<B<90; \quad 70=<C<80; \quad 60+<D<70; \quad F<60 \]
Final Grade:

- At any time during the semester, you will be able to know how many points you have accumulated.
- If you are 1 point (or less) away from the next grade up, please answer the following before asking for reconsidering your grade:
  - Do you have an upward trend in your grades (i.e.’ have you improved your performance over the semester?) or at least you have been consistent?
  - Have you submitted all the assignments in time (lab report, paper reviews, term papers)?
  - Have you taken all quizzes?
  - In short: the final grade may be reconsidered only for students that did their best.

GUIDELINES

Quizzes and Exam (50%):

- The quizzes are to be answered within the time limit set by the instructor (10-20 min). In general, they will be handed at the beginning of the class (25%).
- There will be one midterm but no final exam (25%)
- Missed quizzes and midterm exam would require a written University excuse: otherwise a zero will be assigned.

Lab Sessions and Reports (20%):

- The date for two 60-90 minute lab sessions on fluorescence spectroscopy/imaging will be decided to accommodate everyone’s schedule.
- A lab report, including a summary of experimental results, interpretation and discussion will be submitted within -10 days form the lab session (TBA).
- A lab guide will be provided a week before the lab session, describing the objectives, experimental protocols and the guidelines for lab report.

Topic Lecture and Paper Reviews (10%):

- About five topic-lecture and paper-discussion sessions will be scheduled in the semester.
- Tentative topics for these sessions are specified in the detailed syllabus.
- Each student will provide a 20-30 min lecture on the selected topic and lead the paper discussion, at least once per semester. (5%)
- The paper(s) will be assigned/chosen at least a week before the session.
- All students will also provide a written review of the lecture and papers within a week of the session (5%).

Term Project (20%):

- The term project would consist on writing and presenting a research proposal targeting a specific relevant biomedical problem with one of the optical spectroscopy technologies covered in class.
- A topic for the term project will be discussed and defined between the instructor and each student within the first 4 weeks of classes.
- The term paper should clearly state the project specific aims, background and significance, material/methods to be used, a time-table and budget. (15%)
- Project oral presentation to the class will evaluated based on both instructor and Peer. (5%)

Javier A. Jo
Grading disputes:

- If you wish to dispute the grading of a specific assignment, quiz or exam, please approach the instructor **within 1 week** of the grade being handed back to the class; thereafter the grade will not be changed.
- If you want to dispute the final grade you will need to quickly see the instructor before they are submitted by the end of the semester.

University-Approved Absences:

- Work missed due to absences will only be excused for University-approved activities in accordance with TEXAS A&M UNIVERSITY STUDENT RULES (see [http://student-rules.tamu.edu/rule7.htm](http://student-rules.tamu.edu/rule7.htm)). Specific arrangements for make-up work in such instances will be handled on a case-by-case basis. *This will only be possible if the student lets the instructor know about this absence with at least a week in advance.* Obviously this restriction does not apply to medical or personal emergencies.
- “University-Approved Absences” are for activities formally scheduled with the Department of Student Activities (see: 7. Attendance, [http://student-rules.tamu.edu](http://student-rules.tamu.edu)). There are two kinds of activities: Authorized Activities (associated with classes), and Sponsored Activities (generally student organization activities). Just because an activity is suggested by a faculty member, it does not necessarily mean it is a “University-Approved activity.” Additional details are available at [http://stuact.tamu.edu/activitylist/letter.html](http://stuact.tamu.edu/activitylist/letter.html)
- In accordance with recent changes to Rule & , please be aware that in this class any “injury or illness that is too severe or contagious for the student to attend class” will require “a medical confirmation note from his or her medical provider” even if the absence is for less than 3 days.

Academic Misconduct:

- Academic misconduct (see [http://www.tamu.edu/aggiehonor/acamisconduct.htm](http://www.tamu.edu/aggiehonor/acamisconduct.htm) for definitions) will not be tolerated.
- Academic misconduct will be dealt with according to University Regulations.
- **Academic misconduct in ANY Quiz, Exam or Assignment will automatically imply a grade reduction of 30 points.**
- A second violation receives an F* in the course and an “Honor Violation Probation.”
- **Academic misconduct in the term project means an automatic F* in the course and “Honor Violation Probation.”**

Aggie Honor Code:

“An Aggie does not lie, cheat, or steal, or tolerate those who do.” It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty. Conduct contradicting to this policy will be punished according to the current rules and regulations. For details see [http://www.tamu.edu/aggiehonor/](http://www.tamu.edu/aggiehonor/)

Americans with Disabilities Act:

The *Americans with Disabilities Act (ADA)* is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Student with Disabilities in Room B118 of Cain Hall, or call 845-1637.

**SYLLABUS**
- **DATES FOR LECTURES, LAB SESSIONS, PROJECT PRESENTATIONS AND QUIZZES ARE TENTATIVE.**
- **DATES FOR EXAM AND TERM-PAPER SUBMISSION ARE FINAL**

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<tr>
<th>Week</th>
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<th>Topic</th>
<th>Important Events</th>
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<tr>
<td>1</td>
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<td>Introduction: Course Overview</td>
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<td>Overview of Optical Spectroscopy, Properties of Light.</td>
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<td>09/09</td>
<td>Light-Matter Interaction</td>
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<td>Absorption Spectroscopy (ABS)</td>
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<td>Fluorescence Spectroscopy</td>
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<td>Lecture and paper Discussion 1: SSFS and applications</td>
<td>Quiz 2</td>
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<td>Time-Resolved Fluorescence Spectroscopy (TRFS)</td>
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<td>Lecture and paper Discussion 2: TRFS and applications</td>
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<td>Monte Carlo Simulation of Fluorescence</td>
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<td>Fluorescence Lifetime Imaging (FLIM)</td>
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<td>Multivariate Statistical Analysis</td>
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<td>Statistical Classification, Performance Measurements.</td>
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<td>Lab on FLIM</td>
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<td>Introduction to Optical Imaging: Part 2 (Dr. Kristen Maitland)</td>
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<td>Thanksgiving Holiday</td>
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<td>Project Presentation</td>
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**Term Paper Due Date**