NEW COURSE PROPOSAL FORM AND ISSUES TO ADDRESS

1. List School, Department, course number and course title

   School of Science
   Biology 128
   Advanced Human Anatomy

[Upper division courses, for purposes of approval, are characterized by at least two of the following guidelines:

   a) have college-level prerequisites;

   The prerequisites will be the successful completion of Chemistry 8, 9 and 10, 11; and Biology 1, 1L, 2 and 2L.

   b) require an in-depth study of a subject rather than a survey or introduction, and presume the necessary introductory work has been completed;

   The course will be taught in a progressive manner, proceeding from the embryological and developmental stages to the mature stages for each of the regions of the human body. Histology (the study of tissues) will also be incorporated into the course. Classical embryology and histology used to be taught in the department but are no longer part of the curriculum. By offering this course, the students will be exposed to these important aspects of anatomy.

   c) demand rigorous reading/writing/discussion skills as well as an intellectual readiness and personal maturity in handling complex issues that are characteristic of advanced students;

   One of the beauties of teaching a dissection based anatomy course is that the students and I will have no idea what we will find. Now, most of the anatomic structures will be present, but the cadavers may exhibit the effects of disease and/or surgery. Anatomical variations and anomalies may also be present. The ability to navigate the anatomy of the human body requires a mental flexibility. It is this uncertainty that that leads me to encourage the students to “tolerate ambiguity”.

   d) include course objectives that entail high levels of cognitive, affective, or psychomotor achievement.]

The student will learn:

- how the embryological develop of a human results in the formation of the organs
- how disruptions of embryological development can lead to variations, anomalies or misplacements of the organs

- the specific anatomy of the structures and organs of the human body (i.e. size, color, orientation, among other characteristics)

- the three dimensional relationships of the structures and organs of the human body

- the anatomic bases for clinical conditions

- the skills necessary to dissect a human cadaver

- to identify by appearance the tissues of the body

- the physical properties of the tissues

- to tolerate ambiguity: what is seen in a text or lab atlas may not correlate with what you discover or observe in the course

2. Justification for the course
In this section explain why the course is being proposed. Grounds may include but are not limited to: new developments in the discipline, the needs of majors/minors, the needs of other departments, the needs of students fulfilling other College requirements (such as area requirements, etc.).

The Biology Department proposes to offer an upper division human anatomy course. A course of this type has been discussed for several years. The motivation to offer an upper division anatomy course stems from curricular barriers for our majors. We have offered a lower division human anatomy course (Bio 15, 16) since the late 1970s. This course was instituted as a part of the cooperative nursing program with Samuel Merritt Hospital. In the late 1980s, the Health Science program was created and Bio 15, 16 was incorporated as (and still is) a requirement. Because Bio 15, 16 is lower division, it is not attractive to Biology majors who already have a high number of required courses for their major.

A small handful of Biology students have taken Bio 15, 16 over the years, but the course was taken as a general elective. This not an attractive path because the course is lab based and requires considerable time for preparation. I am constantly asked why Bio 15, 16 is not regarded as an upper division course with the amount of time and work required. So given these variables, very few Biology majors have taken the lower division course during its history. Even
though a few Biology majors opted to take the course, many have urged the Biology Department to offer an upper division course to meet their needs.

There is a pedagogical justification for an additional human anatomy course. The lower division course is taught using cadavers that have been previously dissected and the students learn the anatomic structures following a systemic (organ) perspective (e.g. bones, muscles, nervous system and so on). In the advanced course, the students will learn anatomy from a regional perspective and the students will perform the dissections themselves to expose and discover the anatomic structures. This will require specific lab skills and the ability to take images from an atlas or computer and translate the images into a 3-dimensional visualization of the cadaver. The latter method is more challenging as it also requires the student to integrate structures from the different organ systems into an understanding of a particular region. The higher expectations for the upper division course will be consistent with the department's expectations for upper division courses.

Finally, there is an external pressure to offer an upper division course. The Ohio State University School of Medicine now requires that applicants have completed an anatomy course that includes a lab incorporating dissection or the use of prosections. As I learned at the American Association of Clinical Anatomists meeting this past year, this requirement will become a trend for most of the medical schools. Many of our majors pursue medicine, now they will have to take an anatomy course to fulfill the prerequisites for medical school. This brings us back to the original upper division conundrum – our majors needing an upper division Human Anatomy course to fulfill the requirements of their major and to prepare for postgraduate study in the medical field.

In addition, please address the following specifics:

a) Objectives of the course: Indicate expected student outcomes, for example, competence in using methodologies specific to this field, assessing data/statistics, survey of literature, in-depth research, etc.

Using anatomic nomenclature, describe the position and orientation of the structures of the body.

Describe the organization of the human body from simplest to most complex (cell to tissue to organ).

Describe the embryological basis for the organization of the body.

Describe the organization of each organ system from simplest to most complex.
Demonstrate proficiency of the dissection skills taught in the laboratory.

Evaluate case studies and journal articles related to anatomy.

b) Describe how the objectives listed above relate to Department, School, or College goals.

The following are the goals and objectives of the Biology Department (in red, new course responses in blue):

**Program goals:**

- provide students exposure and content across the major organizational areas of Biology, including: evolution, organismal biology, genetics, cell and molecular biology and ecology.

  This course will be placed on the Organismal Group of our upper division courses.

- provide students a working knowledge of one or more of the major organizational areas within biology of their choosing.

  This course will give students the opportunity to study organismal biology on the human level.

- help students develop critical thinking skills associated with their discipline of interest

  This course will challenge students to think about how humans function in different environments.

- help students develop skills associated with information literacy in their discipline of interest

  Students will learn from the library assignment of this course how to acquire knowledge about human anatomy and anatomic variation, and the application of that anatomic knowledge to clinical conditions.

- help students acquire scientific and technical skills to function in a biology laboratory or field study setting.

  Students will demonstrate the dissection skills necessary to expose the anatomic structures, in situ.
• expose students to some of the philosophical and ethical issues that confront them as biologists

Students will how anatomic anomalies and disease may affect the deliverance of health care and its cost.

The following are learning objectives for the Biology Department that will be incorporated into this course.

**Learning Objectives**
The following will apply to all biology majors graduating from Saint Mary’s College. However, students in other majors and those participating in some of our service courses, will experience some learning outcomes and not others.

All candidates for the award of BS in biology will demonstrate mastery in the following Student Learning Objectives:

• Students can describe the structure and function of cellular components and explain how they interact in a living cell.
• Students can describe how cells interact to develop tissues and organs, and how these contribute to a functional organism.
• Students can describe and use new and existing methods and technologies in and out of the laboratory setting.
• Students can demonstrate understanding of the scientific process by employing critical reading skills in their evaluation of the scientific literature.
• Students can formally communicate the results of biological investigations using both oral and written communication skills.
• Students can apply the process and method of scientific inquiry including observation.

c) Describe the kinds of assignments/tasks that will be typical of those used to evaluate the performance of students in the course. Will the pass/fail grading option be allowed?

The students will be presented with Keynote lectures which will also be available online. The slides of the lectures will consist primarily of images onto which the students will write notes and terminology. I firmly believe that writing the names of the structures is a key component of learning. Slides that have all of the information written on them could be learned by reading a book, there is no learning engagement.

The students will be given 4 exams (including the final) during the semester. The exams will consist of matching, true-false, multiple-multiple choice and essay
questions. Multiple-multiple choice questions are becoming standard for qualifying exams in the health professions. My exams will give the students experience in these types of questions.

The students will also be graded on an oral presentation that describes an anomaly that is present in either their cadaver or a previously dissected cadaver. The Head of Collection Management for the library will give the students guidance as to the resources available. The purpose of this project is to give the student an appreciation that variation is the basis of evolutionary adaptation.

Finally, the students’ dissections will be graded and laboratory practicals will be administered. The lab practicals will be hands-on exams that require the identification of anatomic structures using the anatomic specimens. Being able to determine the 3-dimensional relationships of the structures will be an important factor in these exams.

Pass/fail will not be an option.

3. Student Population
Identify who the anticipated students will be: department majors? majors from other departments? students fulfilling other requirements? Also give an estimate of how many students will be taking the course when offered.

This course will be limited to Biology and Biochemistry majors (due to the prerequisites). The course will be limited to 12 students, this is dictated by the acquisition of three cadavers. Four students will be assigned to each cadaver.

4. Relationship to present College curriculum
Indicate where this course fits in relationship to other courses in the department. Identify any needed modification to (or deletion of) existing courses as a result of offering this course. List courses in other departments related to or affected by this course, particularly the potential impact (either positive or negative) of this course on other departments and programs.

This course will be placed in our Organismal Group. All Biology majors are required to take one course from this Organismal Group. Adding this course will not result in the elimination of any courses. We do not foresee courses in other programs being negatively affected by this course.

5. Any extraordinary implementation costs
Indicate whether there will be any special or additional equipment necessary to run the course? special classroom or other physical space requirements?

The Biology Department has the laboratory space and equipment
necessary to store and perform dissections on cadavers. The largest cost for the course will be to acquire the cadavers. Three cadavers will be purchased each year that the course is offered. As of now, the Department plans to offer the course each year in the Spring semester.

The cost of each cadaver is $2500. We already purchasing 1-2 cadavers each year and have done so for many years (for the lower division Human Anatomy course, Biology 15, 16), so we will need to purchase two additional cadavers. We project the additional cadaver cost to be $5000. There will be a coordinated flow of cadaver use. The cadavers dissected in this course will be used by the lower division course in the following Fall semester. The combined lab fees for this course and the lower division course total over $14,000 each year so we can cover the cadaver costs through our existing lab fees. Additional expenses will be needed for disposable items such as latex gloves and scalpel blades. The estimate costs will be $1000.

6. Library Resources Prior to submission of the proposal to the UEPC, a library review must be conducted. Contact the appropriate librarian subject selector who will conduct and complete the Library Resources Review, and then submit it to the UEPC at the same time as the course proposal. The librarian subject selector will consider the following when completing the Library Resources Review:

Please see the appendix with the Head of Collections Management’s report.

*7. Course credit and grading options    Indicate the value of the course in SMC course credits (1, .5, .25) , the total number of hours that the student will spend in the classroom during the semester, the projected out-of-class time per week (average), and the format of the course (lecture/discussion, lab, studio, etc.)

This course will be given a 1.0 course credit. There will be 3 hours per week of lecture and 4 hours per week of laboratory. The students will also be expected to perform dissections outside of the schedule laboratory (2-3 hours per week). They will be given their own key for access to the laboratory so that they can perform the out of class dissections at times convenient to them. The number of hours required to study for the exams will depend on each student, this is hard to predict. Past feedback from students is that they begin studying for my exams at least a week in advance.

8. Prerequisites, corequisites (If applicable)

Chemistry 8, 9, 10, 11 and Biology 1,1L, 2, 2L

9. Course description wording for the appropriate College catalog
Please submit the actual catalog wording, not an approximation.
Department: Biology 128

Title of course: Advanced Human Anatomy

Number of hours: 3 hours of lecture and 4 hours of lab per week

Duration of course: 13 weeks, one semester

Course credit: 1.0 course credit, upper division

Course description: Study of the anatomy of the human body. This course is taught through a regional approach, emphasizing the structural relationships and functional aspects of gross anatomy, histology and embryology. References to the evolution of anatomic structure will be included. Extensive out of class dissections will be expected. This course is limited to Biology and Biochemistry majors.

Prerequisites: Biology 1, 1L, 2, 2L

10. Course content
A syllabus, with tentative reading list, topics to be covered, and major assignments, will normally be expected. In addition, in courses where activities predominate, describe the role of such activities in the design and purpose of the course.

The lecture and laboratory syllabi are included as separate sections in this packet.

11. Review of experimental offering
Address what was learned and if any changes grew out of the experimental offering of the course. (A course should be offered on an experimental basis before it is presented for formal approval and inclusion in the catalogue.)

Offering the course on an experimental basis gave me insights as to what was possible for an undergraduate advanced anatomy course. I was also able to get a feel for what the students learned in the prerequisite courses. The current syllabi included in this packet reflect the changes that I have made to the course. Some of the changes simply involved the chronology of the material and other changes reflect subtractions and additions of information. I believe that the changes will result in a course that

1) will be presented in a comprehensive manner at an appropriate

2) will flow well throughout the semester
and

3) coordinates the lecture and the laboratory.

Note: Course evaluations are included as a separate section in this packet.