In dialogue with scientists, philosophers, and theologians, the course: examines current developments in developing scientific disciplines; studies the challenges and implications for medicine, society, and religion that concern these developments; and explores ways to address these challenges and implications that are scientifically relevant and religiously inspired in the context of the new evangelization. In its three parts, the course examines, first, human genetics by focusing on: genetic information, testing, screening, therapy, pharmacogenomics, and enhancement. Second, the course studies new biotechnologies that rely on genetics (i.e., synthetic biology and regenerative medicine). Third, the course discusses current biotechnological developments in neuroscience, oncofertility, nanotechnology, cybertechnology, robotics, artificial intelligence, and astrobiology.

Learning goals/objectives
By the end of the course, the students will be able to:
1) acquire scientific literacy to discuss current biotechnological developments;
2) identify and analyze challenges and implications for medicine, society, and religion raised by contemporary biotechnological developments;
3) engage in dialogue with scientists working in these areas of biotechnological research;
4) address challenges and implications by relying on contributions from science and religion;
5) integrate these challenges and implications in an articulated pastoral approach to evangelization.

Reading materials
The readings include a selection of readings for each session. They are available online (pdf) in the course’s Canvas, i.e., the interactive web site accessible through Agora portal (or http://cms.bc.edu). The books indicated in the Syllabus are available at the School of Theology and Ministry Library Course Reserve. Extra readings are provided to facilitate your further research.

Responsibilities
The course requires that the students attend the sessions, do all the assigned readings in preparation for each session, participate actively in class discussions, and submit the papers on time. If unable to attend a session, please e-mail me by noon the day before, explaining why.
Regular and punctual attendance is required. Students are allowed two unexcused absences. Three or more unexcused absences will result in the loss of the grade awarded for the student’s attendance. Absences may be excused with either: (1) advance permission from the instructor or (2) documentation after the absence, such as a doctor’s note.
Preparedness consists of familiarity with the readings. Participation implies engagement in class discussion on the readings assigned for each session.
Take notes as you do your reading. Think about the issues raised, the information that the Authors are conveying, the questions and concerns that you have. You should contribute thoughtful ideas, opinions, and questions to our discussions.

On the readings assigned for each session:
- identify the Authors’ major theses;
- highlight the Authors’ strengths and limits;
- write at least three personal questions to contribute to our class discussion.

Requirements and evaluation criteria
The course requirements are:

1) one page-long summary-synthesis and three questions on the readings assigned for Session 2. Please write a short personal reasoned summary, integrated by your critical reflection and by three conclusive questions on the readings assigned for the session. Upload your page on the appropriate Canvas section at the latest on the day before class, before 12:00 noon (5 points, 5%);
2) one page-long summary-synthesis and three questions on the readings assigned for Session 5. Please write a short personal reasoned summary, integrated by your critical reflection and by three conclusive questions on the readings assigned for the session. Upload your page on the appropriate Canvas section at the latest on the day before class, at 12:00 noon (5 points, 5%);
3) one short reflection paper, 500 words long (20 points, 20%). In the short reflection paper, you will reflect on the readings and discussions of sessions 7, 8, and 9. The following question might help you: “What are the challenges that these scientific developments raise for religious discourse and practice?” This short paper is due the day before Session 10, no later than 12:00 noon. Upload your reflection paper on the appropriate Canvas section.
4) the student’s attendance (10 points, 10%);
5) the student’s participation in class discussions (10 points, 10%);
6) the final exam (50 points, 50%) will be replaced by one of two alternative options:

(a) a final 20-page research paper, due on Wednesday, May 10, 2017 at 12:00 noon. The 20-page research paper will study a specific topic chosen among the topics addressed during the course, by focusing on one or more specific aspects. Research need not to be extensive, but should be adequate to allow you to address the topic of interest with some degree of mastery and insight. Each student will discuss the topic with me. To decide your topic: e-mail to me the title, the material that you will use, and how you plan to develop the topic by Friday, March 17, 2017 (before 12:00 noon).

(b) two 10-page synthesis papers: the first is due on Friday, March 17, 2017, at 12:00 noon and the second is due on Wednesday, May 10, 2017, at 12:00 noon (50 points, 50%). Each of the two synthesis papers will provide a critical synthesis of the topics studied (i.e., readings, lectures, and class discussions). In particular, the first synthesis paper will concern the sessions that preceded the deadline (i.e., the first half of the semester); the second synthesis paper will concern all the other sessions (i.e., the second half of the semester).

Paper/s delivery
In both cases (i.e., one research paper or two synthesis papers), upload the electronic copy of the paper on Canvas, in the appropriate section, before the deadline/s.

Course overview
Part I: HUMAN GENETICS
Session 1: Genetic information and research
Session 2: Genetic testing and screening
Session 3: Genetic therapy
Session 4: Pharmacogenomics
Session 5: Genetic enhancement

Part II: FROM GENETICS TO NEW BIOTECHNOLOGIES
Session 6: Synthetic biology
Session 7: Regenerative medicine
Part III: CURRENT BIOTECHNOLOGICAL DEVELOPMENTS
Session 8: Neuroscience
Session 9: Oncofertility
Session 10: Nanotechnology
Session 11: Cybertechnology
Session 12: Robotics and artificial intelligence
Session 13: Transhumanism
Session 14: Astrobiology

Readings assigned for each session

Part I: HUMAN GENETICS

Session 1: Genetic information and research

Extra readings

Session 2: Genetic testing and screening
Extra readings


Session 3: Genetic therapy


Session 4: Pharmacogenomics

3) A.K. Daly, "Is There a Need to Teach Pharmacogenetics?," Clinical Pharmacology & Therapeutics 95, no. 3 (2014) 245-247.

Session 5: Genetic enhancement

4) M.J. Mehlman, "Genetic Enhancement in Sport: Just Another Form of Doping?," Recent Patents on DNA & Gene Sequences 6, no. 3 (2012) 240-246.

Part II: FROM GENETICS TO NEW BIOTECHNOLOGIES

Session 6: Synthetic biology


Extra readings

Session 7: Regenerative medicine

Extra readings

Part III: CURRENT BIOTECHNOLOGICAL DEVELOPMENTS

Session 8: Neuroscience

Extra readings

Session 9: Oncofertility

Extra readings


Session 10: **Nanotechnology**


Session 11: **Cybertechnology**


**Extra readings**


Session 12: **Robotics and artificial intelligence**


**Extra reading**


Session 13: **Transhumanism**


**Extra readings**


Session 14: **Astrobiology**


**For Students with Disabilities**

If you have a disability and will be requesting accommodations for this course, please register with either Kathy Duggan (Kathleen.duggan@bc.edu), Associate Director, Academic Support Services, the Connors Family Learning Center (learning disabilities and ADHD) or Paulette Durrett (paulette.durrett@bc.edu), Assistant Dean for Students with Disabilities (all other disabilities). Advance notice and appropriate documentation are required for accommodations.

**Academic Integrity Policy**

Plagiarism is the act of taking the words, ideas, data, illustrations, or statements of another person or source, and presenting them as one’s own. Penalties at Boston College range from a grade penalty to dismissal from the University. To avoid plagiarism, any use of another’s words or ideas must be fully cited. If in the original wording, quotation marks or blocked, indented quotations must be used. For more information regarding plagiarism and other violations of academic integrity, please consult the STM website at [http://www.bc.edu/content/bc/schools/stm/acadprog/acadpol.html](http://www.bc.edu/content/bc/schools/stm/acadprog/acadpol.html)

**The Writing Companions Corner**

The Writing Companions Corner (WCC) offers students assistance at all stages of the writing process on their papers for this class— from the articulation of a thesis statement and developing an outline to the writing itself, editing and revision. Emphasis is on helping students build and hone skills so that they are transferrable to other papers and projects. Proofreading services are not offered through the Writing Companions Corner. For more information and/or to sign up for an appointment, consult the TML website and/or STM News when classes are in session.

**Grading Policy for Graduate Students**

This policy is based on the Academic Policies of Boston College for Graduate Courses. All grading for graduate students in this course is reflective of these descriptions.

- **A** work is exceptional in every respect. There is an active and sophisticated engagement with all aspect of the course, demonstrated through careful analysis or creative treatment of the ideas covered. Both class participation and written work indicate outstanding mastery of content, originality of thought clearly expressed, and clarity in connecting course concepts with ministerial and theological interests.
- **A-** work is superior and above the average graduate level expectations. This involves mastery of the course content, recognition of the "big picture" within which course material is situated, and capacity to make cogent links with one’s ministerial and theological position. This level is reflected in the ability to express one’s thoughts effectively in writing and to contribute significantly to class conversation.
- **B+** work is more than satisfactory at the graduate level. This involves mastery of the course content and the ability to draw connections across course topics and with appropriate theological and ministerial topics. Contribution to class conversation gives evidence of both active listening and thoughtful participation. Written work is clear, focused and well organized.
- **B** work is clearly satisfactory at the graduate level. There is consistent engagement with, and a basic mastery of, the course material with a good command of the various topics.
- **B-** work is barely acceptable at the graduate level. This reflects a basic command of the course material, an adequate articulation of the connections across content areas, and a basic recognition of the implications for pastoral work.
work is marginally acceptable at the graduate level. This is a basic mastery of most of the course materials but not all. It represents that you have slipped below an acceptable level of work in one or two areas.

F work is unsatisfactory and fails to meet the requirements of the course.

Grading Policy for Undergraduate Students
This policy is based on the Academic Policies of Boston College Undergraduate Courses. All grading for undergraduate students in this course is reflective of these descriptions.

A
An outstanding performance with very strong evidence of:
• an insightful and comprehensive grasp of the subject matter;
• a clear ability to make sound and original critical evaluation of the material given;
• outstanding capacity for original creative and/or logical thought;
• an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts both in speech and in writing.

A-
Very good performance with strong evidence of:
• a comprehensive grasp of the subject matter;
• an ability to make sound critical evaluation of the material given;
• a good capacity for original, creative, and/or logical thinking;
• a very good ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts both in speech and in writing.

B+
Above average performance with evidence of:
• a substantial knowledge of the subject matter;
• a good understanding of the relevant issues and a good familiarity with the relevant literature and techniques;
• some capacity for original, creative, and/or logical thinking;
• an above-average ability to organize, to analyze and to examine the subject material in a critical and constructive manner, and
• to express thoughts both in speech and in writing.

B
A generally satisfactory and intellectually adequate performance with evidence of:
• an acceptable basic grasp of the subject material;
• a fair understanding of the relevant issues;
• a general familiarity with the relevant literature and techniques;
• an ability to develop solutions to moderately difficult problems related to the subject material;
• a moderate ability to examine the material in a critical and analytical manner, and to express thoughts in writing.

B-
A barely acceptable performance with evidence of:
• a familiarity with the subject material;
• some evidence that analytical skills have been developed;
• some understanding of relevant issues;
• some familiarity with the relevant literature and techniques;
• partially successful attempts to solve moderately difficult problems related to the subject material and to examine the material in a critical and analytical manner;
• basic competence in writing.

C work is marginally acceptable at the undergraduate level. This is a basic mastery of most of the course materials but not all. It represents that you have slipped below an acceptable level of work in one or two areas.

F work is unsatisfactory and fails to meet the requirements of the course.