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|  | **SOUTH DAKOTA BOARD OF REGENTS**  ACADEMIC AFFAIRS FORMS |
| Revisions to General Education Requirements |
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Use this form to request any change to the General Education Requirements specified in Policies 2:7 – Baccalaureate General Education Curriculum and 2:26 – Associate Degree General Education Requirements. This includes any changes to the System General Education Requirements, Institutional Graduation Requirements, Globalization/Global Issues Requirement, and Writing Intensive Requirement.

**NOTE: This process does not include approval for the development of a new course. If the proposal does include the development of a new course, the new course process must be completed before the course will be considered for inclusion in any set of the General Education Requirements**

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| DSU |  | Arts & Science |  | *Dr. David Kenley* |  | 9-23-22 |
| Institution |  | Division/Department |  | Institutional Approval Signature |  | Date |
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|  |  |  |  |  |  |  |
| Institution |  | Form Initiator |  | Dean’s Approval Signature |  | Date |
|  |  |  |  |  |  |  |
| DSU |  |  |  | A picture containing text  Description automatically generated |  | 1-5-23 |
| Institution |  | Division/Department |  | Institutional Approval Signature |  | Date |

**Indicate (X) the component of the General Education Curriculum that the proposal impacts.**

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| **X** | System General Education Requirements |

**Indicate (X) the revision(s) that is being proposed (more than one may be checked).**

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|  | Revision to an approved course |
| **X** | Addition of a course to the set of approved courses |
|  | Deletion of an approved course from the set of approved courses |

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| **Section 1. Provide a Concise Description of the Proposed Change** |
| DSU is proposing to add BIOL 235/235L Introduction to Biotechnology to the approved list of courses for Goal 6 Natural Sciences. BIOL 235/235 is currently on the list being offered by NSU and SDSU. With the universities’ goal to increase students in the Cyber Operations and Network Security Administration majors, this added course will be of interest to these students. |
| **Section 2. Provide the Effective Date for the Proposed Change** |
| Fall 2023 |

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| **Section 3. Provide a Detailed Reason for the Proposed Change** |
| NA |

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| **Section 4. Provide Clear Evidence that the Proposed Modification will Address the Specified Goals and Student Learning Outcomes** |
| See attached syllabus |

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| **Section 5. Provide a Copy of all Course Syllabi and Other Supporting Documentation** |
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Course Syllabus

# Course Prefix, Number, and Title:

BIOL 235 and 235L, Introduction to Biotechnology

# Credits: 3.0

# University Name: Dakota State University

# Academic Term/Year: Summer 2023, Second Session

## Last date to Drop and receive 100% refund:

June 29th, 2023

## Last date to Withdraw and earn a grade of 'W':

July 24th, 2023

# Course Meeting Time and Location: Asynchronous and Online

# Instructor Information:

## Name:

Dr. Andrew Sathoff

## Office:

Science Center 146D

## Phone Number:

605-291-5455

## Email Address:

[ndrew.sathoff@dsu](mailto:).edu

## Office Hours:

By appointment on Zoom or over the phone:

Tuesdays and Wednesdays from 9-11 AM

Thursdays from 2-4 PM

# Approved Course Description:

## Catalog Description:

Presents a basic overview of biotechnology emphasizing current DNA and RNA technologies and structure and function of biomolecules. The application of these techniques in the fields of medicine, agriculture, forensics and the environment is emphasized. Scientific methods, current good laboratory practices (cGLP), standard operating procedures (SOP), environmental regulations and ethics of the biotechnology industry will also be covered.

# Prerequisites:

## Course Prerequisite(s):

None

## Technology Skills:

Students will use the following computer technology skills: word processing, PowerPoint, spreadsheet analysis and graphing, information management, Desire 2 Learn, cell phone applications, and Labster.

# Course Materials:

## Required Textbook(s):

A Crack in Creation: Gene Editing and the Unthinkable Power to Control Evolution

by Jennifer Doudna and Samuel Sternberg

ISBN-13: 978-1328915368

Paperback, used, electronic, audio, and rented versions of this text are fine.

## Optional Materials:

Introduction to Biotechnology, 4th Edition by William Thieman and Michael Palladino

ISBN-13: 978-0134650197

Paperback, used, electronic, and rented versions of this text are fine.

-This is the definitive biotechnology text and will be the source of most of the lecture material

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# Student Support:

## DSU Knowledge Base:

The DSU Knowledge Base contains links and resources to help students by providing information about the following topics: User Accounts & Passwords, Academic Tools & Resources, Software & Apps Support, WiFi & Network Access, Campus Emergency Alert System, Campus Printing, IT Security & Safe Computing, and the Support Desk (which is there to help both on and off-campus students). The Knowledge Base can be accessed through the link below:

* [DSU Knowledge Base](https://support.dsu.edu/TDClient/KB/)

## D2L Support for Students:

The D2L Support for Students site is designed to provide DSU students a D2L support resource center that contains user guides, tutorials, and tips for using the D2L learning environment. The D2L Support for Students site can be accessed through the link below:

* [DSU D2L Support Resources for Students](https://d2l.sdbor.edu/d2l/home/606414)

# Course Delivery and Instructional Methods:

***Lectures***

This course will primarily consist of lecture and active participation. On Mondays, several short, narrated PowerPoint lectures will be posted on D2L along with the activities that I expect you to complete for the week.

# Classroom Policies:

## Attendance and Make-up Policy:

Late work will be accepted up to 24 hours after the deadline for 50% credit; submissions more than 24 hours late will not be accepted.

Students must make every effort to take the regular lecture exams; make-ups may be arranged for excused absences only. To qualify for a make-up exam, students must notify the instructor as soon as possible to explain the circumstances that require a make-up exam. Excused absences are granted at the discretion of the instructor and a time for a make-up exam scheduled.

## Accessibility Statement:

Dakota State University strives to ensure that physical resources, as well as information and communication technologies, are reasonably accessible to users in order to provide equal access to all. If you encounter any accessibility issues, you are encouraged to immediately contact the instructor of the course and Dakota State University's ADA Office, which will work to resolve the issue as quickly as possible.

DSU's ADA Office is located in the Learning Engagement Center and can be contacted by calling 605-256-5121 or emailing [dsu-ada@dsu.edu](mailto:dsu-ada@dsu.edu). Students seeking ADA accommodations (such as non-standard note taking or extended time and/or a quiet space taking exams and quizzes) can log into the DSU portal to access <https://portal.sdbor.edu/dsu-student/student-resources/disability-services/Pages/default.aspx/> for additional information and the link to the Disability Services Request Form. You will need to provide documentation of your disability and the ADA Coordinator must confirm the need before officially authorizing accommodations.

## Academic Honesty Statement:

Cheating and other forms of academic dishonesty run contrary to the purpose of higher education and will not be tolerated in this course. Please be advised that, when the instructor suspects plagiarism, the Internet and other standard means of plagiarism detection will be used to resolve the instructor’s concerns. The South Dakota Board of Regents Student Academic Misconduct Policy can be found here: [SDBOR Policy 2.33](https://www.sdbor.edu/policy/Documents/2-33.pdf).

All forms of academic dishonesty will result in penalties. The minimum penalty will be a grade of zero for the work attempted. A student guilty of a more serious offense or the multiple instances of dishonesty will receive a grade of "F" for the course and may even be suspended for one or more semesters or permanently dismissed from the university. Suspension and dismissal must be approved by the President of Dakota State University.

# Communication and Feedback:

## Preferred Email Contact Method:

Please direct all email correspondence to [andrew.sathoff@dsu.edu](mailto:andrew.sathoff@dsu.edu). Do not send messages in D2L.

## Email Response Time:

I will respond to emails within 24 hours. The response time may be a little longer on weekends and holidays. But, I am addicted to my phone and will usually respond to simple email questions within hours and sometimes minutes.

## Feedback on Assignments:

Exams will be graded and returned within three days of submission.

## Requirements for Course Interaction:

Participating in class on a regular basis is essential for succeeding in Biotechnology. Subjects presented in class are explored in further detail through student discussion posts and are generally the topics covered most on exams. Also, interaction among Book Club group members is required.

# Student Learning Outcomes:

Biotechnology influences our lives to such a great extent, but it is overlooked because the underlying science behind these advances is incomprehensible to most students. For example, the majority of our calories come from consuming genetically modified plants. Very few people understand exactly how these genetically modified plants were created, and that uncertainty causes fear and distrust. Scientific literacy will be developed throughout this summer session, and you’ll be able to make an informed decision regarding controversial issues. You will be able to apply foundation knowledge in biotechnology to take a stance towards genetically modified plants and other contentious scientific advances. Also, a better awareness of all the biotechnological advances at your fingertips will be developed. Hopefully, you appreciate the scientific advances that surround you, which make your life easier!

Since this is an online class, you can’t sit in Science Center 101 and do actual biotech. experimentation. Probably, most of you will not become wet lab researchers once you graduate, so developing the manual dexterity to perform these complex lab assays is unnecessary. But, I want you to have an awareness of what actual occurs in a research lab, so you have a better idea how all of these biotechnological advances were developed using the scientific method. We will be doing several online Labster activities. In Labster, you have an opportunity to engage in the scientific method in a virtual lab setting that has almost a videogame format. You will be analyzing data to generate evidence-based conclusions using some excellent, modern simulations in a state-of-the-art virtual lab.

Speaking of research, we will highlight some of the newest advances in biotechnology as we progress through this summer session. A lot of the things we will be discussing in class may appear to be science fiction, but in reality, they are occurring in research labs across the world. Over the first two weeks of this course, we will build foundational skills in the methods of biotechnology. Then, you will use this scientific evidence to construct arguments related to these contemporary issues. So, when you’re scrolling on your phones, you’ll be able to distinguish between the pseudoscience spam from the actual scientific breakthroughs!

# Evaluation Procedures:

## Assessments:

***Exams:*** As a student, I felt that most of my learning occurred when I was studying for an exam. Exams in this course will be frequent (three exams this summer session) and focused on the underlying biological principles. By having more exams, I hope to encourage deeper learning throughout this summer session opposed to just at the middle and end. The format of the exams will consist entirely of short answer questions, but since I do not want to make this class too difficult, all exams will be open note. Exams will be taken using the Respondus Monitor proctoring system on D2L (again, notes are allowed) and will only be open for 4 days (Thursday-Sunday).

These exams will consist of major topics covered in lecture and laboratory, including any material discussed in *A Crack in Creation*. If I do not cover a topic in class, it will not be on the exam.

***Laboratory work:*** We’ll use Labster for our online labs. Though I’d prefer in-person labs, Labster currently produces some of the best online labs that I’ve seen. Essentially, your avatar is placed in a virtual lab full of all the scientific equipment that you could imagine, and you are guided through the laboratory experience. The six Labster labs that we’ll be performing are: Experimental Design, Molecular Cloning, Next Generation DNA Sequencing, CRISPR-Cas, Viral Gene Therapy, and Tissue Engineering

***Quizzes:*** Following each week of lecture, there will be a quiz. These quizzes will serve as a tool to help you keep pace with the course. Quizzes will open-book and consist of multiple-choice questions, which will come directly from lecture.

***Book Club:*** This summer we will be reading *A Crack in Creation: Gene Editing and the Unthinkable Power to Control Evolution* by Jennifer Doudna and Samuel Sternberg. In assigned groups, you will discuss each chapter over Zoom meetings at an agreed upon time (I do not envision these meetings lasting much more than 30 minutes). For each Zoom discussion session, there will be a different group leader, who will create four questions to facilitate discussion. These questions will be submitted to me on D2L, and the group leader will also report back to me about Zoom meeting attendance.

Before meeting with your group members, you are expected to have read the chapter thoroughly, looked up things that confused you, and be prepared to converse about the chapter with your peers. If you do not attend these required group discussion meeting, you will lose points from the Book Club section.

In addition to participating in the Book Club discussion, you will reflect on each chapter of *A Crack in Creation*. Learning is a process of making new meanings from our experiences and prior interpretations. Reflection brings closure to learn activity. Reflective writing is very similar to journaling and will be modelled in class. These reflective writing assignments will be one page in length and graded upon completion.

***Discussion Posts:*** Discussion posts are an interactive portion of Biotechnology where you take ownership of the course and become knowledge creators. Learning is a social activity and is best accomplished when interacting with other students. But, as a student, I found the traditional, required discussion board posts and responses to be a painful, somewhat meaningless activity. So, for the required discussion posts, you will be creating memes related to the lecture material. If you find one of your classmates’ memes clever or funny, please comment on it.

## Final Examination:

The final exam will be open from August 3rd at 6 AM until August 4th at 11:59 PM. The final exam is **NOT cumulative.** We’ll just treat it as the third exam covering the plant biotechnology and bioremediation unit of the course.No exams will be given early, and only emergencies of a catastrophic nature will be accepted as an excused absence.

## Performance Standards and Grading Policy:

Throughout this summer session, exam and assignment grades will be posted on D2L. Grades for the course will be determined using a weighted average based on the following exams and assignments (details provided below):

60 points: Exam 1

60 points: Exam 2

60 points: Exam 3

60 points: Quizzes

30 points: Discussion Posts

120 points: Labster Laboratories

145 points: Book Club (*A Crack in Creation*)

**535 TOTAL POINTS**

***Letter grades in BIOL 235 are then calculated by the following formula:***

**A** *90.00 and above*

**B** *89.99 - 80.00*

**C** *79.99 - 70.00*   
**D** *69.99 - 60.00*  
**F** *59.99 and below*

## Student Verification Statement and Proctoring Policy:

Federal law requires that universities verify the identity of students when course materials and/or course assessment activities are conducted either partially or entirely online. A student’s Desire2Learn (D2L) login and password are intended to provide the student with secure access to course materials and are also intended to help the university meet this federal mandate. Some DSU Faculty also require the use of a proctor for exams in distance-delivered (Internet) courses and this requirement provides a second level of student identity verification. Students are responsible for any proctoring fees, if applicable. Finally, an instructor who uses web conferencing technology may require students to use a webcam during exams as another means of student identity verification through voice and visual recognition.

Exams will be proctored using Respondus Monitor (lockdown browser with webcam) on D2L.

# Tentative Course Outline and Schedule:

| **Week** | **Theme** | **Date** | **Topics and Lecture** | **Assigned Readings** |
| --- | --- | --- | --- | --- |
| 1 | **Recombinant DNA Technology and Genomics** | June 26 – July 2 | Intro to Class, Intro to Biotechnology, Restriction Enzymes, Transformation, Cloning | *A Crack in Creation,* Chapter 1 (The Quest for a Cure) |
| 2 | July 3 – July 9 | Gel Electrophoresis, DNA Sequencing, Gene Expression Analysis, CRISPR | *A Crack in Creation,* Chapter 2 (A New Defense),  **Exam 1** |
| 3 | **Proteins as Products and Animal Biotechnology** | July 10 – July 16 | Biotech Drugs, Protein Folding, Post-Translation Protein Modifications, Protein Production | *A Crack in Creation,* Chapter 3 (Cracking the Code) |
| 4 | July 17 – July 23 | Animals in Research, Creating Dolly, Human Organ Development, Producing Human Antibodies in Animals | *A Crack in Creation,* Chapter 4 (Command and Control),  **Exam 2** |
| 5 | **Plant Biotechnology and Bioremediation** | July 24 – July 30 | Genetic Engineering of Plants, Genetic Pesticides, Enhanced Nutrition, Biopharming | *A Crack in Creation,* Chapter 5 (The CRISPR Menagerie) |
| 6 | July 31 – August 6 | Intro to Bioremediation, Soil Cleanup, Petroleum-Eating Bacteria, Phytoremediation Deepwater Horizon Oil Spill | *A Crack in Creation,* Chapter 6 (To Heal the Sick), **Exam 3** |

# Freedom in Learning Statement:

Students are responsible for learning the content of any course of study in which they are enrolled. Under Board of Regents and University policy, student academic performance shall be evaluated solely on an academic basis and students should be free to take reasoned exception to the data or views offered in any course of study. It has always been the policy of Dakota State University to allow students to appeal the decisions of faculty, administrative, and staff members and the decisions of institutional committees. Students who believe that an academic evaluation is unrelated to academic standards but is related instead to judgment of their personal opinion or conduct should contact the dean of the college which offers the class to initiate a review of the evaluation.