San José State University  
Chemistry Department  
CHEM 131B, Biochemistry Lab, Sections 01-05, Spring 2016

Course and Contact Information

Instructor: Professor Laura Miller Conrad
Office Location: Duncan Hall 608
Telephone: (408) 924-4957
Email: laura.miller.conrad@sjsu.edu (preferred method of contact)
Office Hours: W/R 10:00 – 11:00 AM, and by appointment

Instructor: Caitlin Crowder
Office Location: Duncan Hall 502
Telephone: (408) 924-5496
Email: caitlin.crowder@sjsu.edu (preferred method of contact)
Office Hours: R 12:00 – 1:00 PM, and by appointment

Class Days/Time: W 3:00-5:50 PM, F 1:30-5:20 PM
Classroom: Duncan Hall 609 and 611
Prerequisites: CHEM 100W, CHEM 130A, CHEM 131A (with grades of “C” or better; “C-“ not accepted)
Pre/Corequisite: CHEM 130B or CHEM 130C
GE/SJSU Studies Category: Partial fulfillment of Area R

Canvas Web Page

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the Canvas learning management system course website. You are responsible for regularly checking with the messaging system through Canvas to learn of any updates.
Course Description

A capstone course on advanced isolation techniques and enzyme methodology. Chem 131B is the second semester of a two semester biochemistry laboratory course. The laboratory work is associated with intermediate qualitative and quantitative techniques in modern biochemistry. A capstone experience requires students to integrate principles, theories, and methods learned in previous courses throughout the major. Students will be working on research projects that will allow analysis, synthesis, and evaluation of learned knowledge and will communicate the results of the projects effectively in a professional manner.

Learning Outcomes

CHEM 131B addresses the following Program Learning Objectives:

1. PLO (5): Demonstrate understanding of core concepts and to effectively solve problems in biochemistry.
2. PLO (6): Answer questions regarding safe practices in the laboratory and chemical safety.
3. PLO (7): Demonstrate safe laboratory skills (including proper handling of materials and chemical waste) for particular laboratory experiments.
4. PLO (9): Effectively present a scientific paper orally, as per at an American Chemical Society symposium.
5. PLO (10): Write a formal scientific laboratory report, using the format and style of an article in a peer-reviewed American Chemical Society journal.

GE Learning Outcomes (GELO)

GE Area R (Earth and Environment) Goal

Students will cultivate knowledge of the scientific study of the physical universe or its life forms. Students will understand and appreciate the interrelationship of science and human beings to each other.

Upon successful completion of this course, students will be able to:

1. Area R GELO (1): Demonstrate an understanding of the methods and limits of a scientific investigation.
2. Area R GELO (3): Apply a scientific approach to answer questions about the earth and environment.

This course fulfills the GE writing requirement as follows:

Summary of Required Writing

Total writing will include a minimum of 3000 words:

1. In-class writing will include maintaining an accurate and up-to-date laboratory notebook
2. Rough draft of final lab report
3. Final draft of final lab report
“A minimum aggregate GPA of 2.0 SJSU Studies (R, S, & V) shall be required of all students as a graduation requirement.” To see full text, review University Policy S11-3 at http://www.sjsu.edu/senate/docs/S11-3.pdf.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. CLO (1): Apply proper laboratory practices including safety, waste management, and record keeping.
2. CLO (2): Use and understand modern biochemical techniques and instruments.
3. CLO (3): Plan, design, and execute experiments based on biochemical literature.
4. CLO (4): Interpret experimental results and draw reasonable conclusions.
5. CLO (5): Communicate effectively through written and oral reports.

Required Texts/Readings

Textbook

No textbook is required for the course.

Other Readings

Alberts et al., Molecular Biology of the Cell, 4th edition (optional). This is a good resource for background on molecular biology concepts. It can be accessed for free on Pubmed at http://www.ncbi.nlm.nih.gov/books/NBK21054/

Occasionally papers from the scientific literature will be suggested for additional information on certain topics covered.

Other equipment / material

Research laboratory notebook with duplicate pages; scientific calculator (equivalent to Ti30) capable of performing linear regression analysis.

Library Liaison

Ann Agee (ann.agee@sjsu.edu)

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.
Assignments:
The course will consist of the following:

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam (Mar. 25) (GELO 1, 3; CLO 2,4; PLO 5)</td>
<td>100</td>
</tr>
<tr>
<td>Final Lab Report (GE writing requirement; CLO 1-4, PLO 5,8)</td>
<td>100</td>
</tr>
<tr>
<td>Assignments (GELO 1, 3; CLO 1-3; PLO 5-7)</td>
<td>100</td>
</tr>
<tr>
<td>Notebook and Instructor Evaluation (GE writing requirement; CLO 1-4, PLO 7)</td>
<td>75</td>
</tr>
<tr>
<td>Journal Article and Research Presentations (GELO 1, 3; CLO 4-5; PLO 5,8)</td>
<td>50</td>
</tr>
<tr>
<td>Final Exam (May 20, 12:15-4:30 PM)</td>
<td>100</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>525</strong></td>
</tr>
</tbody>
</table>

Instructor evaluation:
The instructor evaluation is based on technique, performance, lab organization, lab work, comprehension of experiments, safety, attitude, proper use and disposal of chemicals, preparation prior to class, following directions, lab/lecture involvement and participation, etc.

Exams:
Two exams will be given during the semester, a midterm and a final. The midterm will be given during one of the scheduled lab periods. The date is given on the attached schedule. The final will be given during the final exam period and is also noted on the schedule. Exams will cover theory, experimental protocol and data analysis. The content will be a combination of objective, calculations, short answer and short essay questions. Calculators (non-graphing, no memory) are permitted during exams and all exams are closed book.

Laboratory notebook:
It is imperative that all experimental data are recorded in the laboratory notebook and that this information is kept up-to-date. Never depend on your memory to record such data; you will forget it if it is not written down. Notebook entries should be clear and concise. Entries should be neat enough and annotated so that the experimental notes and data can be read and understood by others. Your notebook will be graded on these criteria.

The laboratory notebook does not have to look like a final report! Do not use scratch paper for experimental notes and data so that you can neatly transfer such into the notebook at a later time. It is quite acceptable to cross out information (with a single line) and rewrite it. Further, in professional settings, the notebook is the primary document verifying your intellectual property. Establishing good notebook habits now will prepare you for your career.

You will use a laboratory notebook with duplicate pages. The duplicate pages will be removed from the notebook and turned into the instructor at the end of each laboratory period.
**Laboratory report:**
A report of all laboratory work will be required in the form of a scientific journal article. This is to be completed outside of the lab period. The required content and format will be explained in class. Although the experiments may be performed in groups, all interpretations must be your own. Details regarding the format of the paper will be available on Canvas and discussed periodically.

**Oral presentations:**
Two oral presentations are required. One presentation is a “lab talk” covering background and work done towards the laboratory project (will be presented near the end of the semester). The other presentation is a “journal article” presentation. The journal article must be approved by the instructor and the approved journal article must be emailed to the instructor at least two weeks in advance of the presentation. The selected article should be a recent primary article (published within the last 5 years) and closely related to the laboratory project. The required content and format will be explained in class and posted on Canvas.

[University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) states, “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

**Grading Policy**
Points will be distributed as described above. I reserve the right to scale exam grades. If scaled, scores will never be scaled down from your raw score. Generally, the average score on an exam will be scaled to the C+/B-range, though I reserve the right to adjust this in either direction if, in my estimation, the class overall performed differently than a “typical” class. The course grade will be determined from the resulting average of the point total as follows:

<table>
<thead>
<tr>
<th>Scaled Score Average</th>
<th>Final Course Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>97-100</td>
<td>A+</td>
</tr>
<tr>
<td>93-96.9</td>
<td>A</td>
</tr>
<tr>
<td>90-92.9</td>
<td>A-</td>
</tr>
<tr>
<td>87-89.9</td>
<td>B+</td>
</tr>
<tr>
<td>83-86.9</td>
<td>B</td>
</tr>
<tr>
<td>80-82.9</td>
<td>B-</td>
</tr>
<tr>
<td>77-79.9</td>
<td>C+</td>
</tr>
<tr>
<td>73-76.9</td>
<td>C</td>
</tr>
<tr>
<td>70-72.9</td>
<td>C-</td>
</tr>
<tr>
<td>67-69.9</td>
<td>D+</td>
</tr>
<tr>
<td>63-66.9</td>
<td>D</td>
</tr>
<tr>
<td>60-62.9</td>
<td>D-</td>
</tr>
<tr>
<td>&lt; 60</td>
<td>F</td>
</tr>
</tbody>
</table>

**Missed Exams and Quizzes**
If an exam or quiz is missed without a legitimate excuse a scaled score of 0 will be entered for that exam. If an acceptable excuse is provided then the exam grade will be prorated. In no case will a make-up exam or quiz be given.
Exam Regrades
If you feel that an error was made in the grading of your exam you may submit the exam, together with a
written description of the error, to me for regarding not later than one week after the graded exam is returned to
the class. However, I will not entertain requests for more partial credit on a problem unless the posted partial
credit scheme was not properly applied to your exam. Be aware that students who submit frivolous regrade
requests may become ineligible to receive future letters of recommendation from me.

Late assignments:
Assignments are due at the beginning of the laboratory period, unless otherwise stated. Assignments submitted
on the due date but later than the beginning of class are considered late and subject to 5% point reduction (and
subsequent 5% point reductions for each further day late).

Passage of the Writing Skills Test (WST) or ENGL/LLD 100A with a C or better (C- not accepted), and
completion of Core General Education are prerequisite to all SJSU Studies courses. Completion of, or
coregistration in, 100W is strongly recommended. A minimum aggregate GPA of 2.0 in GE Areas R, S, & V
shall be required of all students.”

Note that “All students have the right, within a reasonable time, to know their academic scores, to review their
grade-dependent work, and to be provided with explanations for the determination of their course grades.” See
University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Classroom Protocol
Students are expected to arrive on time and attend all classes. Students should be courteous and professional to
other students, the instructor and guest instructors. NO FOOD OR DRINKS ALLOWED IN THE
LABORATORY.

Laboratory Safety
You should read the safety section of the SJSU Catalog under the Chemistry Department. Note in particular:
“Failure to comply with proper procedures and prescribed safety cautions shall subject the student to
disciplinary action. 1) Any student who engages in unauthorized experimentation or who seriously disregards
safety, thereby endangering self or others shall be withdrawn immediately from the class with a grade of F. 2)
Any student who shows persistent disregard for safety may have his/her grade lowered, and may risk being
withdrawn with a final grade of F.”

NOTE: A safety quiz will be given during the second day of class and must be passed with a grade of
80% or better. The quiz will be based on the SJSU Chemistry Department Safety Rules found at:
http://www.sjsu.edu/chemistry/docs/Safety_Sheet_IIc.pdf.

University Policies

General Expectations, Rights and Responsibilities of the Student
As members of the academic community, students accept both the rights and responsibilities incumbent upon all
members of the institution. Students are encouraged to familiarize themselves with SJSU’s policies and
practices pertaining to the procedures to follow if and when questions or concerns about a class arises. To learn
important campus information, view University Policy S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf and
SJSU current semester’s Policies and Procedures, at http://info.sjsu.edu/static/catalog/policies.html. In general,
it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If
such conversation is not possible, or if it does not address the issue, it is recommended that the student contact
the Department Chair as the next step.
Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Consent for Recording of Class and Public Sharing of Instructor Material

University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor’s permission to record the course and the following items to be included in the syllabus:

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor’s permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
  - It is suggested that the greensheet include the instructor’s process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
  - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

Accommodation to Students' Religious Holidays

San José State University shall provide accommodation on any graded class work or activities for students wishing to observe religious holidays when such observances require students to be absent from class. It is the responsibility of the student to inform the instructor, in writing, about such holidays before the add deadline at the start of each semester. If such holidays occur before the add deadline, the student must notify the instructor,
in writing, at least three days before the date that he/she will be absent. It is the responsibility of the instructor to
make every reasonable effort to honor the student request without penalty, and of the student to make up the

Student Technology Resources

Computer labs for student use are available in the Academic Success Center at http://www.sjsu.edu/at/asc/
located on the 1st floor of Clark Hall and in the Associated Students Lab on the 2nd floor of the Student Union.
Additional computer labs may be available in your department/college. Computers are also available in the
Martin Luther King Library. A wide variety of audio-visual equipment is available for student checkout from
Media Services located in IRC 112. These items include DV and HD digital camcorders; digital still cameras;
video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones,
projection screens and monitors.

SJSU Peer Connections

Peer Connections’ free tutoring and mentoring is designed to assist students in the development of their full
academic potential and to inspire them to become independent learners. Peer Connections tutors are trained to
provide content-based tutoring in many lower division courses (some upper division) as well as writing and
study skills assistance. Small group and individual tutoring are available. Peer Connections mentors are trained
to provide support and resources in navigating the college experience. This support includes assistance in
learning strategies and techniques on how to be a successful student. Peer Connections has a learning commons,
desktop computers, and success workshops on a wide variety of topics. For more information on services,
hours, locations, or a list of current workshops, please visit Peer Connections website at
http://peerconnections.sjsu.edu for more information.

SJSU Writing Center

The SJSU Writing Center is located in Clark Hall, Suite 126. All Writing Specialists have gone through a
rigorous hiring process, and they are well trained to assist all students at all levels within all disciplines to become
better writers. In addition to one-on-one tutoring services, the Writing Center also offers workshops every
semester on a variety of writing topics. To make an appointment or to refer to the numerous online resources
offered through the Writing Center, visit the Writing Center website at http://www.sjsu.edu/writingcenter. For
additional resources and updated information, follow the Writing Center on Twitter and become a fan of the SJSU
Writing Center on Facebook. (Note: You need to have a QR Reader to scan this code.)

SJSU Counseling and Psychological Services
The SJSU Counseling and Psychological Services is located on the corner of 7th Street and San Carlos in the
new Student Wellness Center, Room 300B. Professional psychologists, social workers, and counselors are
available to provide confidential consultations on issues of student mental health, campus climate or
psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or
learn more information, visit Counseling and Psychological Services website at http://www.sjsu.edu/counseling.
# CHEM 131B, Biochemistry Lab, Spring 2016, Course Schedule

The schedule is subject to change. Changes will be noted in class.

<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Topics, Readings, Assignments, Deadlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 29</td>
<td>Check-in, semester goals, how to read a journal article, library tools</td>
</tr>
<tr>
<td>2</td>
<td>Feb 3</td>
<td>Intro to cloning, Safety quiz, Pipette lab</td>
</tr>
<tr>
<td>3</td>
<td>Feb 5</td>
<td>DNA technology lab (meet in DH 503), DNA database assignment</td>
</tr>
<tr>
<td>4</td>
<td>Feb 10</td>
<td>Journal articles due/presentation sign up, Cloning strategies and molecular biology techniques, Preparation of media/plates, PCR assignment</td>
</tr>
<tr>
<td>5</td>
<td>Feb 12</td>
<td>Primer design (meet in DH 503), Primers due by 9 am on 2/13</td>
</tr>
<tr>
<td>6</td>
<td>Feb 17</td>
<td>Isolate E. coli gDNA and vector DNA (o/n cultures)</td>
</tr>
<tr>
<td>7</td>
<td>Feb 19</td>
<td>Journal article presentations</td>
</tr>
<tr>
<td>8</td>
<td>Feb 24</td>
<td>Bacterial expression vectors, restriction enzymes and agarose gel electrophoresis, Digest vector, PCR of GOI</td>
</tr>
<tr>
<td>9</td>
<td>Feb 26</td>
<td>Agarose gel to check PCR and isolate vector</td>
</tr>
<tr>
<td>10</td>
<td>Mar 2</td>
<td>Journal article presentations</td>
</tr>
<tr>
<td>11</td>
<td>Mar 4</td>
<td>Mega CPEC, Mega CPEC PCR, agarose gel to check Mega CPEC</td>
</tr>
<tr>
<td>12</td>
<td>Mar 9</td>
<td>Transformation and colony PCR, transform Mega CPEC into Top10 E. coli</td>
</tr>
<tr>
<td>13</td>
<td>Mar 11</td>
<td>Colony PCR (3/10 - check transformation colonies, o/n cultures)</td>
</tr>
<tr>
<td>14</td>
<td>Mar 16</td>
<td>Intro draft due, DNA sequencing, DNA sequencing assignment</td>
</tr>
<tr>
<td>15</td>
<td>Mar 18</td>
<td>Recombinant protein expression, DNA sequencing analysis of plasmids</td>
</tr>
<tr>
<td>16</td>
<td>Mar 23</td>
<td>Isolate plasmid (o/n cultures), transform into BL21 E. coli</td>
</tr>
<tr>
<td>17</td>
<td>Mar 25</td>
<td>Midterm Exam, (3/24 - check transformation colonies, o/n cultures), make freezer stocks</td>
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<tr>
<td></td>
<td>Mar 30</td>
<td>Spring break – no class</td>
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<tr>
<td></td>
<td>Apr 1</td>
<td>Spring break – no class</td>
</tr>
<tr>
<td>18</td>
<td>Apr 6</td>
<td>Traditional cloning – isolate vector DNA, PCR of GOI</td>
</tr>
<tr>
<td>19</td>
<td>Apr 8</td>
<td>Digest and isolate vector and PCR product</td>
</tr>
<tr>
<td>20</td>
<td>Apr 13</td>
<td>Results and discussion outline due, DNA ligation, transformation into Top10</td>
</tr>
<tr>
<td>21</td>
<td>Apr 15</td>
<td>Colony PCR (4/12 - check transformation colonies, o/n cultures), prep for sequencing, make freezer stocks</td>
</tr>
<tr>
<td>22</td>
<td>Apr 20</td>
<td>DNA sequencing analysis, isolate plasmid, transform into BL21</td>
</tr>
<tr>
<td>23</td>
<td>Apr 22</td>
<td>Research presentations, (4/21 - check transformation colonies, o/n cultures), make freezer stocks</td>
</tr>
<tr>
<td>24</td>
<td>Apr 27</td>
<td>Soluble recombinant protein expression and SDS-PAGE</td>
</tr>
<tr>
<td>25</td>
<td>Apr 29</td>
<td>Growth experiments (o/n cultures, then start experiment on Friday morning)</td>
</tr>
<tr>
<td>26</td>
<td>May 4</td>
<td>Results and discussion draft due, SDS-PAGE of expressed protein</td>
</tr>
<tr>
<td>27</td>
<td>May 6</td>
<td>Growth experiments (o/n cultures, then start experiment on Friday morning)</td>
</tr>
<tr>
<td>Class</td>
<td>Date</td>
<td>Topics, Readings, Assignments, Deadlines</td>
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<td>---------</td>
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<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>28</td>
<td>May 11</td>
<td><em>SDS-PAGE of expressed protein</em></td>
</tr>
<tr>
<td>29</td>
<td>May 13</td>
<td>Review, check out</td>
</tr>
<tr>
<td></td>
<td>May 16</td>
<td>Final report due by 6 pm</td>
</tr>
<tr>
<td>Final Exam</td>
<td>Fri, May 20, 12:15-4:15 pm</td>
<td>Comprehensive Final Exam</td>
</tr>
</tbody>
</table>