

**Berkeley City College**      **Fall 2015**  
**Mathematics 3E**      **Linear Algebra**      **Code: 40356, 3 units**  
**Syllabus**

**Instructor:** Shawn McDougal      **E-mail:** [smcdougal@peralta.edu](mailto:smcdougal@peralta.edu)

**Office Hours:** MW 1:30-2:30pm, TTh 11-12pm (plus 1 hr by appointment)

**Office Location:** Room 353      **Phone:** (510) 981-5018

**Class Meeting Days/Times:** TTh 9:30-10:45am      **Location:** Room 54

**Prerequisites:** Math 3A, or placement through assessment

**Textbook:** *Linear Algebra: A Modern Introduction*, by David Poole. (3rd edition, 2011)

**Materials:** You should obtain a scientific calculator. Access to a graphing utility for some of homework problems is encouraged but not required.

### **Catalog Description**

Gaussian and Gauss-Jordan elimination, matrices, determinants, vectors in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ , real and complex vector spaces, inner product spaces, linear transformations, eigenvalues, eigenvectors, and applications.

### **Class format**

Our typical class will be a mix of lectures clarifying and expanding upon the points raised in the book and the videos, hands-on problem solving sessions, solution presentations (from students as well as me), and open discussion. About half the class will be "workshop"—you will be working on problems individually or in groups as I go around helping as needed. In addition to providing feedback and guidance, I will often ask you to talk through the problems or ideas with other students. Talking through your ideas with others is a good way to 1) test and refine your ideas, 2) learn multiple ways of thinking about a concept or solving a problem, and 3) practice putting the ideas in your own words.

Every day your main homework is to *prepare for class*: you should come to class having already read the section(s) to be covered in class that day, as well as having watched any designated videos. (There will be usually be one to three short—5 to 10 min.—videos for you to watch.) You should take notes on the examples you see in the videos, get a basic idea of the key concepts and theorems in the book, and know where to find things. You are *not* expected to understand everything you read or see the very first time—that is the point of coming to class and doing the follow-up exercises!—but you will be get the most out of class—and you will not be lost—if you come prepared. For each class I will give a list "suggested homework" problems to guide your study, but I will not collect or grade them.

### **Self-intros**

Every day for the first few weeks of the course, 2-3 students will get a chance to briefly introduce themselves to the class. "Briefly" meaning 30 sec. to 1 min. This will allow all of us to get to know a bit about each other. Include an answer to *one* of the following "questions":

- One experience you had after age 13 that really shaped who you are or how you think.
- Something a lot of people who meet you wouldn't guess about you.
- If you could, what is one thing you would change about society?

## Grading Allotment

	points each	total points	total percent	notes
Quizzes (5)	32	160	40%	7 drop lowest 2
Final Exam	100	100	25%	
Solution Share+Applications Group	20	40	10%	
Moodle Check-ins (20)	4	80	20%	29 drop lowest 9
Connections (4)	5	20	5%	

**Grading Scale** A: 90% - 100 %, B: 75% - 89%, C: 65% - 74%, D: 55% - 64%. F: Below 55%

### Solution Share

I encourage students to learn from each other, take time to really think through challenging problems, and improve their presentation skills. Once during the term, you will prepare and present your solution to a problem selected from the suggested HW. The *Solution Share* is worth 20 points (i.e. 5% of the course total). You will choose which problem to present in advance, from a list of options I provide. The presentations will typically last 3-8 min., with another couple of minutes for questions. Grading will be based on clarity, correctness, and timing. (A rubric will be provided.)

### Applications Group

Once during the semester, students will do a team presentation on an application topic chosen in advance. The *Applications Groups* will take place during the weeks indicated, and the topics will be chosen from the sections indicated. The presentation will be worth 5% (20 points) and will be graded based on both individual and team criteria. (A rubric will be provided.)

### Quizzes

There will be a quiz every two weeks, usually every other Tuesday. There will be 7 quizzes altogether. Each quiz is worth 8% (i.e. 32 points). There are no make-ups. There will be 2 free passes: I will drop your lowest 2 quiz scores, so only your best 5 quizzes will be counted. The quizzes will be mostly based on the suggested HW problems.

### Final Exam

The Final Exam is scheduled for Tuesday, 12/15 in class. It will cover all of the material of the course. Most of the problems will probably be taken from the quizzes. It's worth 25% of the course total.

### Moodle Check-ins

Almost every week you are asked to write two Moodle *Check-ins*. The purpose of the *Check-ins* is to 1) encourage folk to discuss the material outside of class, 2) let me know which concepts I most need to clarify in class, and 3) build community among students. For credit, the check-ins must be posted before the end of the week (Sunday midnight) in the appropriate weekly forum.

In order to receive credit, a *Check-in* must be one of the following:

- a *good question* about a problem or concept or example in the book or in a video
  - e.g. of good question: "On problem X in section Y I tried to find the slope using the formula  $m = \text{change in } x / \text{change in } y$  but got the wrong answer. What am I missing?"
  - e.g. of not-so-good question: "I just don't get problem X."
- an *interesting comment* about a problem or concept or example in the book or in a video

- e.g. of interesting comment: "I wonder how people decide when to fit a line and when to fit a polynomial to a given set of data."
- e.g. of not-so-interesting comment: "Curve fitting is cool!"
- a *substantive response* to someone else's question or comment.
  - e.g. of substantive response: "Seems there should be some sort of convention or standard around how much error there is when you try to fit a line."
  - e.g. of not-so-substantive response: "Me too!"

You are welcome and encouraged to participate frequently in the Moodle discussions, though you will receive credit for at most two *Check-ins* per week. Each *Check-in* is worth 4 points. Out of about 29 *Check-ins*, I will count your highest 20. So, altogether the *Check-ins* are worth 80 points (i.e. 20%).

### Weekly Schedule (tentative)

Week of Tuesday...	Sections	Notes
A25--Week 1	1.1-1.3+cross product,1.4.2	
S1	2.1-2.3	
S8	3.1,2.4(app)	Q1
S15	3.2,3.3a	
S22	3.3b,3.5	Q2
S29--W6	3.6,3.7(app)	
O6	4.1,4.2+geometric interpretation	Q3
O13	4.3,4.4,4.6(app)	
O20	5.1,5.2	Q4
O27	5.3,5.4,5.5(app)	
N3--W11	6.1,6.2	Q5
N10	6.3,6.4	
N17	6.5,6.6,7.1+complex matrices	Q6
N24	6.7(app)	no class Th 11/26
D1	7.2 (skip convergence)	Q7
D8--W16	7.3	
Final Exam on Tuesday 12/15		

Note: "app" means Applications Groups

### Important Dates (cf. BCC Fall 2015 Academic Calendar)

Sep. 6 – Last day to add regular session classes.

Sep. 6 – Last day to drop regular session classes (without a "W") and receive a refund.

Sep. 14 – Last day to file for P/NP grading option for regular session classes.

Oct. 23 – Last Day to File Petitions for AA or AS Degree/Certificate

Nov. 14 – Last day to drop with "W". Attendance Verification Day.

## Connections Assignments

*Connections* is an opportunity for students to connect with diverse colleagues outside of class while reflecting on issues relating to math, personal interest, or community interest.

There will be 4 *Connections* assignments, spaced a week apart. The first is due Friday 9/7 (during Week 2, aka "W2"). The others are due on successive Fridays. Each should take 15-30 minutes to complete.

- Each week (from W2 to W5) students will form teams of 2 or 3 people.
- Each team will submit a roughly 2-3 paragraph write-up.
- Either hardcopy or electronic submission (pdf, rtf, or plaintext format) via Moodle "dropbox" is fine. They are due at the beginning of class. (See *Connections Form* for the required info.)
- Each *Connections* assignment is worth 5 points (i.e. 1.25%).
- In order to get credit for N assignments, each student must team up with at least N different people. (So I suggest you don't team up with the same person every week ;^)
- On each team, there are 2 roles: Initiator and Responder. Students choose who plays what role.
  - The Initiator makes the initial remarks to get the conversation started. The Responder (or Responders) responds to or follows up on the comment.

### Menu of options

1. a recent experience that has really impacted you
2. something you're confused, curious, or excited about in class
3. news story with (interesting, confusing, problematic) use of math
4. example of how (lack of) math knowledge is used to trick people
5. an issue in the school or community that really bothers you and/or an idea for improving things in the school or in the community
6. interview a "community expert" on how math impacts their work or the way they think ("community expert" meaning someone who works at BCC or in the local community)
7. attend and comment on a school or community event related to math, science, or social justice

### Connections Form (template)

Initiator Name:

Responder Name(s):

Date:

Topic: (or Name and Job of Community Expert or Name of Community Event)

Write up:...

## **Suggested Homework Problems**

I will provide a list of suggested HW problems based on the material we cover. If you master the problems you will be well-prepared for the quizzes.

## **Attendance**

Students who miss more than 2 consecutive classes without contacting me to explain their absences may be dropped from the course. Anyone who misses the first 2 class meetings may be dropped. Still, do not assume that I will automatically drop you if you merely stop attending class. Anyone whose name appears on the final grade roster who has not been attending class will receive an F.

## **Academic Honesty**

Any evidence of cheating on an exam or quiz will result in a score of zero (0), and may incur further penalties. Cheating includes but is not limited to bringing notes or written or electronic materials into an exam or quiz, copying off of another person's exam or quiz, allowing someone to copy off of your exam or quiz, and having someone take an exam or quiz for you.

## **General Information/Expectations**

Please turn off your cell phone ringers/alarms during class.

Make sure your preferred email address is listed on Passport and Moodle. For Moodle see <http://eperalta.org/Fall2015/>

I usually don't answer questions about the course material over email. (Reason #1: I don't want to be swamped with emails. Reason #2: I prefer to answer a question once rather than multiple times.) To help you get your questions answered quickly by me and/or other students, and to help students share ideas and build community with each other, you should use the *forums* on Moodle (*not* the messages, which I rarely see.). Also, on Moodle you will be able to review your grades throughout the semester.

## **Student Learning Outcomes**

1. Solve systems of equations using Gaussian elimination and other methods.
2. Use bases and orthonormal bases to solve linear algebra problems.
3. Find eigenvalues and eigenvectors and use them in applications.
4. Prove basic results in linear algebra using appropriate proof writing techniques together with concepts such as those of linear independence of vectors, properties of subspaces, linearity, injectivity and surjectivity of functions, and properties of eigenvectors and eigenvalues.
5. Apply the methods of linear algebra to solve problems from areas such as statistics (curve fitting), physical science and engineering (electrical circuits), business (economic models).

## **Justification for Course**

Satisfies the General Education and Analytical Thinking requirement for Associate Degrees. Provides foundation for more advanced study in mathematics and related fields. Satisfies the Quantitative Reasoning component required for transfer to UC, CSUC, and some independent four-year institutions. Acceptable for credit: CSU, UC. AA/AS area 4b, CSU area B4, IGETC area 2A.

## **Disabilities Statement**

Berkeley City College is committed to providing reasonable accommodations for all individuals with disabilities. Any student with a documented disability needing academic accommodations is requested to speak with Programs & Services for Students with Disabilities (PSSD), located in Room 261 and the instructor as early in the semester as possible. I encourage any student who suspect they may have a learning disability to contact PSSD for assistance. They can be reached by phone at (510) 981-2812 or 2813. All conversations will remain confidential. The syllabus and course material are available in alternate formats upon request.