



**Department of Biology**

**Bio6064; Developmental Biology**

**3 units**

**Spring 2024**

**Meeting days/times: Wednesdays 6:00 – 9:00**

**Meeting location; Sator 120**

INFORMATION	SPECIFICS FOR THE COURSE
<b>Instructor title and name:</b>	Dr. Mike Dorrell
<b>Phone:</b>	619-849-2962
<b>Email:</b>	mdorrell@pointloma.edu
<b>Office location and hours:</b>	Rohr Science 158

Office Hours: M,W 8:30 – 9:30 and Thurs 1:30 – 4:30. I love to meet with (and help) students. If the “office hour” times don’t work for you, please contact me and I am more than happy to find a time that will work. I have an open door policy so if I am in my office, feel free to stop in. I am also available via email for questions most of the time throughout the week and will get back to you ASAP to answer your inquiries.

**PLNU Mission** ⚡

**To Teach ~ To Shape ~ To Send**

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

**Course Description** ⚡

**Catalog description:** Concepts emerging from the union of the two disciplines of evolution and development that help us better understand both the process of development and of the diversity of life forms are central to this course. Emphasis will be placed on the concepts of modularity, developmental master control genes (toolkit genes) and genetic switches that are the keys to explaining how the diversity within the body plans of animals develop. These topics will be addressed from the perspective of teaching for conceptual understanding.

**Full description:** Studying the emergence of life, from the point of fertilization through cell communication and cell/tissue differentiation, and coming to know it at quite a sophisticated level is an awe-inspiring privilege. The remarkable events that each must occur in perfect sequence so that we ourselves become functional human beings are extremely complex. It is no less than a miracle that we each began as a single fertilized cell. The main objective of this course is to study and understand the processes that take place to allow development from a molecular, genetics, and tissue level.

In addition, the knowledge of developmental events are important in our understanding of the mechanism by which evolution can occur, particularly on a macroevolution scale. We will not be studying evolution in all its aspects (fossil record, phylogeny, etc.) as that will be reserved for a separate course (Evolutionary biology). However, we will take our knowledge of embryonic development and apply this to gain a better understanding of evolution as part of the emerging field of Evo - Devo.

**Learning Outcomes:** Besides these ultimate objectives, students will be able to:

- Prepare lab reports demonstrating in-depth observations and analysis of the process of development after performing experiments using various model organisms.
- Understand and describe the specifics of fertilization, gene expression, cell signaling, and tissue differentiation, and how these events relate to our development from a single fertilized cell into a fully developed organism. [PLO #1]
- Summarize the events that occur during development of higher level organs, including neuronal development, cardiovascular systems, and limb development. [PLO #1]
- Design and conduct an independent investigation testing the effects of a teratogen on development using a model organism. [PLO #1]
- Critically evaluate and present primary research literature identifying the research purpose, the important methodology, results and conclusions to an audience relatively knowledgeable in biology.
- Articulate and defend a position on how ‘endless forms most beautiful’ have evolved from a basis of understanding of the importance of development, developmental switches, and genetic mutations (Evo/Devo). [PLO #3]

Required Texts and Recommended Study Resources\*

1. **Lab Manual (required):** *Reader from University Reader*
2. **Related text (required);** *Endless Forms Most Beautiful*. Sean B. Carroll. Norton Pub.
3. **Text (recommended):** *Developmental Biology*. 13th Edition. Michael J. Barresi and Scott F. Gilbert. Oxford University Press, 2024. **(the course follows this text closely so this is a great resource for learning and studying. I recommend renting or ebook unless you want to go into Developmental Biology in which case this is a great resource to own and keep)**

## EVALUATION AND GRADING

Summary: The activities described above will contribute to your total course grade based on the following percentages (these are subject to change slightly):

Exams I, II, and final exam	50 %
Lab work and lab reports	10 %
Journal club; presentation / discussion / questions	13 %
EFMB and Reflection on <i>EFMB</i> evo - devo	12 %
Scientific American and Nautilus article summaries (homework)	5 %
class participation / asynchronous work activities	10 %
<b>Total</b>	<b>100 %</b>

A = 93-100	B- = 80-83	D+ = 67-70
A- = 90-93	C+ = 77-80	D = 63-67
B+ = 87-90	C = 73-77	D- = 60-63
B = 83-87	C- = 70-73	F = 0 - 60

### **Major projects and assignments:**

#### **JOURNAL CLUB:**

A major aspect of keeping up to date with current scientific findings entails reading current primary literature and discussing the findings with colleagues. We will be discussing these articles together. Each person will be assigned one article to present in small groups. This group will be in charge of presenting the major findings of the article in a journal club style format on the assigned week. How you divide the material within your group is up to you. You will be evaluating the other members of your group for participation and their input. I will be evaluating the group on your understanding and presentation of the material. **All students who are not presenting are expected to have read the article.** A significant portion of this evaluation will be based on participation in the discussion, questions asked, etc., even when you are not presenting.

#### **ENDLESS FORMS MOST BEAUTIFUL:**

Along with the text, we will be reading a wonderful book that artfully presents the basic ideas of evolutionary developmental biology by one of the premier Evo/Devo scientists, Sean Carroll. This book does a wonderful job of tying together the major concepts of the course. We will be reading, and discussing this book throughout the course. As with the journal club (primary literature article), each person will be assigned (within a group) one discussion to help lead. This is expected to be a discussion with every member of the class, but **the assigned group is expected to briefly review the major concepts covered in those chapters (~20 minutes), and have prepared discussion questions to help keep the discussion focused and moving.** *Please do not try to present everything in the reading, but rather provide an overview of key “take-home” messages and how they relate to class and our understanding of Evo-Devo. Most of this should be leading a discussion.*

You are expected to read the text even when you are not presenting in order to be able to participate in discussion (a graded component). This supplementary reading will also help you understand the main aspects of the material.

## REFLECTION ON EVOLUTION AND DEVELOPMENT

Over the course of the semester, we will be relating development to the mechanisms of evolution. During this time, we will also discuss the theological implications of these topics. As part of this section, we will be reading the book “Endless Forms Most Beautiful” (*EFMB*), by Sean Carroll. This is an excellent book which I feel ties together the concepts of developmental biology and does a great job of relating them to our current understanding of evolution. As part of this section, you will be expected to write a ~2500 word reflection of development and evolution that incorporates aspects of your learned knowledge of developmental biology, our reading of *EFMB*, and our discussions throughout the course. These discussions are designed to present the evidence from developmental biology in support of evolution, and to discuss how science and religion can tie together rather than conflict, they are not designed to force any particular stance on this topic. Your stance can shine through in this reflection, regardless of what your viewpoint may be (in fact, I encourage that), as long as your ideas are clearly stated and supported, and a clear understanding of what we’ve learned in developmental biology is apparent.

## BRIEF SUMMARIES OF SCIENTIFIC AMERICAN AND NAUTILUS ARTICLES

Periodically throughout the semester, I will be distributing some relatively simple overviews that relate to particular topics (6 total are planned). These are designed give you an overview of what we are discussing, even while we are diving into some of the more intimate details. They are also designed to give you some extra historical background information, or make you think about the context of the information we are learning as it applies to human life and our beliefs. You will be expected to write and turn in a short summary of each of these (~500 words) that summarizes the article, its main points, and how it fits into our topics.

## LAB

We will be performing multiple lab experiments during class, using various model organisms to observe normal development, and to test the effects of teratogens on development. You will also be designing, implementing, and analyzing your own “self-designed” teratogen experiment. You will have two lab write ups to complete throughout the semester, one on testing teratogens in axolotls, and then the final lab report for your self-designed teratogen experiment.

## Tentative Schedule:

Week	Date	Topic	Textbook Ref.
Week 1 (1-10)	Hr 1	Intro to Dev Bio;	Chapter 1.1 – 1.6 (up through “The Tree of life: section) (Pgs. 1 – 26)
	Hr 2	Chick embryo development ( <i>no lab report</i> )	
	Hr 3	Questions of Dev. Bio, History, Stages of Development, and Fate Mapping	
	On own	<b>Asynchronous:</b> Genetic equivalence, DNA compaction, and gene regulation <b>Reading:</b> Scientific American Article 1: Developmental Switches, <b>Lab prep:</b> Axolotl development and the effects of retinoic acid or cyclopamine	Chapter 3.1 – 3.3 (pgs 49 – 59), and 3.5 through pioneer trxn factors 64 – 72)

<b>Week 2</b> <b>(1-17)</b>	<b>Hr 1</b>	<b>Lab:</b> adding teratogens to axolotls ( <i>full lab report</i> ) <b>Class work:</b> Differential gene expression (cont.)	Chapter 3.4, 3.6 – 3.7 (pages 59 – 63, 75-84)
	<b>Hr 2</b>	<b>Class work:</b> Differential gene expression (cont.) Discuss Sci. American Article #1	
	<b>Hr 3</b>	<b>Lab: Washing teratogens / Chick observations</b>	
	<b>On own</b>	<b>Asynchronous:</b> Cell – Cell communication (juxtacrine and paracrine signaling) <b>Reading: Primary literature article 1:</b> Science article on epigenetics and honeybees and worksheet	Chapter 4.1 – 4.4, 4.7 (Pgs 87-98, 106-118)
<b>Week 3</b> <b>(1-24)</b>	<b>Hr 1</b>	<b>Class work:</b> Article 1 presentation. Cell communication- induction and competency.	Chapter 4.5 – 4.6 , 4.9 (98 – 106, 128 – 131)
	<b>Hr 2</b>	<b>Lab:</b> Analysis of axolotl teratogen effects. - <i>Start working on lab write-up (due 2-13)</i>	
	<b>Hr 3</b>	<b>Class work:</b> Signaling cascades and juxtacrine inhibition	
	<b>On own</b>	<b>Asynchronous:</b> Specification <b>Reading:</b> Endless Forms Most Beautiful (Intro and Chapters 1 – 3) and Nautilus article #1: inherited epigenetics (500 word summary due before class)	
<b>Week 4</b> <b>(1-31)</b>	<b>Hr 1</b>	<b>Class work:</b> Cell-cell communication in development (cont.)	Chapter 4.9 (128 – 131)
	<b>Hr 2</b>	<b>Class work: EFMB overview presentation and discussion</b> (Intro – Ch. 3)	
	<b>Hr 3</b>	<b>Class work:</b> Catch up and review session	
	<b>On own</b>	<b>exam 1 (on canvas).</b> <b>Independent learning; Chapter 5.1 and 5.8 reading on Stem Cells</b>	Chapter 5.1 and 5.8 (pdf on canvas)
<b>Week 5</b> <b>(2-7)</b>	<b>Hr 1</b>	Lab techniques lecture	Ch 8.1-8.2 Ch. 9.1 Ch. 11.5 Chapter 7.1 – 7.2 (Pgs. 211 – 223)
	<b>Hr 2</b>	<b>CRISPR – Cas9 lab part 1;</b> designing guides	
	<b>Hr 3</b>	<b>Class work:</b> Early development; autonomous specification in snails, C-elegans, and tunicates	
	<b>On own</b>	<b>Asynchronous:</b> Fertilization part 1 <b>Reading:</b> Pri. Lit #2; iPS cells and SMA (wksht) <b>Lab:</b> Lab writeup for axolotl lab	
<b>Week 6</b> <b>(2-14)</b>	<b>Hr 1</b>	<b>Class work:</b> Prevention of polyspermy	Ch 7.3 (223 - 240)
	<b>Hr 2</b>	<b>Lab:</b> Sand dollar fertilization lab (no lab report)	
	<b>Hr 3</b>	<b>Class work: Presentation and discussion of primary literature article 2</b> (iPS cells and SMA)	
	<b>On own</b>	<b>Asynchronous:</b> Early development; Sea Urchins <b>Reading:</b> Nautilus article on Sex and gender (500 word summary)	Ch. 11.1 – 11.3 (335-350)

<b>Week 7</b> <b>(2-21)</b>	<b>Hr 1</b>	<b>Class work:</b> Drosophila development	Chapter 10
	<b>Hr 2</b>	<b>Lab:</b> Zebrafish observations and self-designed teratogen experiment (physiologically relevant concentration).	
	<b>Hr 3</b>	<b>Class work:</b> Drosophila development (cont.)	Chapter 10
	<b>On own</b>	<b>Asynchronous:</b> Early development in zebrafish <b>Reading:</b> Primary literature article 3... Generation of Novel wing pattern by wingless	Ch. 12.3 – 12.4, 12.7 – 12.8 (pgs. 372 – 382, 387 – 399)
<b>Week 8</b> <b>(2-28)</b>	<b>Hr 1</b>	<b>Class work:</b> Drosophila development (cont.)	Chapter 10
	<b>Hr 2</b>	<b>Primary literature #3 presentation --- wingless</b>	
	<b>Hr 3</b>	<b>Class work:</b> Drosophila development (cont.)	Chapter 10
	<b>On own</b>	<b>Asynchronous:</b> Early development in birds and early mammalian development <b>Reading:</b> Endless Forms Most Beautiful (Ch 4 – 8)	Ch. 13.1 – 13.3 Ch 14.3 – 14.5
<b>March 6</b>		<b>No Class (Spring break)</b>	
<b>Week 9</b> <b>(3-13)</b>	<b>Hr 1</b>	<b>catch-up / review (Ch. 7 – 11) and EFMB presentation and discussion. Ch. 4 – 8</b>	
	<b>Hr 2</b>	<b>CRISPR-Cas9 lab part 2;</b> electroporation	
	<b>Hr 3</b>	<b>Class work:</b> Early development in mammals	Ch. 13.4 – 13.5
	<b>3-18</b>	<b>exam 2. (on canvas)</b> <b>Reading:</b> Nautilus Article #3 (zebrafish organizer) + 500 word summary	
<b>Week 10</b> <b>(3-20)</b>	<b>Hr 1</b>	Lab: CRISPR – Cas 9; part 3 (amplification)	Chapter 13 cont. (catch up)
	<b>Hr 2</b>	<b>Class work:</b> Early development in mammals	
	<b>Hr 3</b>	<b>CRISPR-Cas9 lab part 3;</b> setting up sequencing	
	<b>On own</b>	<b>Asynchronous:</b> Neurulation / brain growth <b>Reading;</b> Primary literature article #4—Nanog and ground state pluripotency (worksheet)	Ch. 15.1 – 15.2 (481-495)
<b>Week 11</b> <b>(3-27)</b>	<b>Hr 1</b>	<b>Class work:</b> Ectoderm; Neural tube development	Ch. 15.2 – 15.3 Ch. 16.1 – 16.2
	<b>Hr 2</b>	<b>Primary literature article #4 presentation and discussion; Nanog and ground state pluripotency</b>	
	<b>Hr 3</b>	<b>Class work:</b> Ectoderm; CNS dev. cont.: The human brain	Ch. 16.3 (518-524)
	<b>On own</b>	<b>Asynchronous:</b> Creativity and cooperation: roles in human evolution Brief neural tube review “quiz” <b>Happy Easter!</b>	

Week 12 (4-3)	Hr 1	<i>Class work:</i> Neural Crest	Ch 17.1, 17.3 (525-531, 536-542)
	Hr 2	<i>Lab:</i> Make serial dilutions of teratogen for self-designed experiment	
	Hr 3	<i>Class work:</i> Neural Crest	Ch. 17.4 – 17.5 (542-548)
	On own	<i>Asynchronous:</i> Watch first 45 minutes of “What Darwin Never Knew” <i>Reading:</i> Scientific American Article; “What makes us human” + 500 word summary + <i>Asynchronous:</i> short review assignment on human evolution	
Week 13 (4-10)	Class work	Neural Crest cells (part 3)	Ch. 17.6 – 17.8 (549-561)
		What Darwin Never Knew, Legos, and Evo-Devo reflection	
	On own	<i>Asynchronous:</i> Neural crest review “quiz” <i>Reading:</i> Endless Forms Most Beautiful (Ch. 9 – 11) <b>Work on Evo-Devo reflection paper</b>	
Week 14 (4-17)	Hr 1	<i>Lab:</i> Add teratogens to self-designed experiment	
	Hr 2	<b>Class work: Endless Forms Most Beautiful (Ch. 9 – 11) presentation and discussion</b>	
	Hr 3	<i>Lab:</i> Wash off teratogens for self-designed experiment	
	On own	<i>Asynchronous:</i> Heart & blood vessel development <i>Writing:</i> Introduction and methods for Self-designed teratogen lab report <i>(Due: EFMB reflection paper – April 22nd)</i>	
Week 15 (4-24)	Hr 1	<i>Class work:</i> Tetrapod limbs	Ch. 21.1 – 21.3 (663-675)
	Hr 2	<i>Lab:</i> Analyzing your data (teratogen exp.)	
	Hr 3	<i>Class work:</i> Tetrapod limbs part 2	Ch. 21.4 – 21.6 (676-692)
	On own	<i>Asynchronous (short):</i> Making tetrapod limbs <i>lab: Self-designed teratogen lab report</i> Ch. 21.7 – 21.9 (693-699)	
Week 16 (Final exam)	In Class	<b>Catch up and review for final exam (via zoom unless we are way behind; bring questions)</b>	
	On own	<b>Final Exam (on canvas)</b>	

## **Content Warning\***

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive various types of information. In [class name], all of the class content, including that which may be intellectually or emotionally challenging, has been intentionally curated to achieve the learning goals for this course. The decision to include such material is not taken lightly. These topics include [list topics]. If you encounter a topic that is intellectually challenging for you, it can manifest in feelings of discomfort and upset. In response, I encourage you to come talk to me or your friends or family about it. Class topics are discussed for the sole purpose of expanding your intellectual engagement in the area of [subject/major], and I will support you throughout your learning in this course.

## **Trigger Warning\***

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive several types of information. In [class name], we will cover a variety of topics, some of which you may find triggering. These topics include [list topics]. Each time this topic appears in a reading or unit, it is marked on the syllabus. The experience of being triggered versus intellectually challenged are different. The main difference is that an individual must have experienced trauma to experience being triggered, whereas an intellectual challenge has nothing to do with trauma. If you are a trauma survivor and encounter a topic in this class that is triggering for you, you may feel overwhelmed or panicked and find it difficult to concentrate. In response, I encourage you to take the necessary steps for your emotional safety. This may include leaving class while the topic is discussed or talking to a therapist at the Counseling Center. Should you choose to sit out on discussion of a certain topic, know that you are still responsible for the material; but we can discuss if there are other methods for accessing that material, and for assessing your learning on that material. Class topics are discussed for the sole purpose of expanding your intellectual engagement in the area of [subject/major], and I will support you throughout your learning in this course.

## **Incompletes and Late Assignments**

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Late assignments will be deducted points based on the amount of time past the due date that they are submitted. In general, there will be a 10% reduction for each day late.

## **Spiritual Care\***

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith.

If you have questions, a desire to meet with the chaplain or have prayer requests you can contact your professor or the [Office of Spiritual Life and Formation](#).

## **State Authorization** ⚡

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

## **PLNU Copyright Policy** ⚡

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

## **PLNU Academic Honesty Policy** ⚡

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

## **Artificial Intelligence (AI) Policy\***

You are allowed to use Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor.

## **PLNU Academic Accommodations Policy** ⚡

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center ([EAC@pointloma.edu](mailto:EAC@pointloma.edu) or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

### **Language and Belonging\***

Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality.

You may report an incident(s) using the [Bias Incident Reporting Form](#).

### **Sexual Misconduct and Discrimination\***

In support of a safe learning environment, if you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that accommodations and resources are available through the Title IX Office at [pointloma.edu/Title-IX](http://pointloma.edu/Title-IX). Please be aware that under Title IX of the Education Amendments of 1972, faculty and staff are required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at [counselingservices@pointloma.edu](mailto:counselingservices@pointloma.edu) or find a list of campus pastors at [pointloma.edu/title-ix](http://pointloma.edu/title-ix).

### **PLNU Attendance and Participation Policy**⊕

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. Therefore, regular attendance and participation in each course are minimal requirements.

If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an “F” grade.

Students who anticipate being absent for an entire week of a course should contact the instructor in advance for approval and make arrangements to complete the required coursework and/or alternative assignments assigned at the discretion of the instructor. Acceptance of late work is at the discretion of the instructor and does not waive attendance requirements.

Refer to [Academic Policies](#) for additional detail.

### **Synchronous Attendance/Participation Definition**

For synchronous courses that have specific scheduled meeting times (including in-person, hybrid, and synchronous online courses), absences are counted from the first official meeting of the class regardless of the date of the student’s enrollment. For courses with specific attendance requirements, those requirements are outlined in the course syllabus.

### **GPS Academic Resources**

PLNU offers the following free academic resources virtually for Graduate Professional Studies (GPS) Students. Visit myPLNU through the links below for more information.

- [The GPS Writing Center](#) offers:
  - **Zoom Writers Workshops** offered each quad on a variety of helpful topics
  - **One-to-one appointments** with the Writing Coach
  - **Microlearning YouTube Video Library** for helpful tips anytime
  - [Research Help Guide](#) to help you start your research
  - The physical office is located on the third floor of the [Mission Valley Regional Center](#) off the student lounge
- [Academic Writing Resources Course](#): Found on your Canvas Dashboard, this course is non-credit with 24/7 access, no time limits, and self-paced content. [Watch a quick video run-through](#) and take time now to explore!
- [Tutoring](#): Students have access to 24/7 live or scheduled subject tutoring through Tutor.com, including a Paper Drop-Off Service with feedback within 12 hours.

We are here to support you! Contact us anytime: [GPSWritingCenter@pointloma.edu](mailto:GPSWritingCenter@pointloma.edu)