MOLECULAR, CELL AND DEVELOPMENTAL BIOLOGY MAJOR 2021 – 2022

Preparation for the Major			
	Life Science Series		**Physical Science Series**
Chemistry	14A or 14AE, 14B or 14BE, 14BL, 14C, 14CL□, 14D	**OR**	20A, 20B, 20L, 30A, 30AL, 30B, 30BL□
Math	3A, 3B, 3C **or** **Life Sci 30A, 30B, Stats 13 or LS40**		31A, 31B, 32A
Physics	5A, 5B, 5C		1A, 1B, 1C, 4AL, 4BL
Life Science	**7A** (Cell & Molecular Biology), **7B** (Genetics, Evolution, & Ecology), **7C** (Physiology & Human Body) **23L** (Intro to Lab & Scientific Method)		

IMPORTANT NOTES – Preparation for the Major

□ **Chem 14CL or Chem 30BL is not required on the major, but most pre-health professional schools and possibly some graduate schools still require an organic lab class.**

- **Students must earn a grade of C- or better in each prep course, & achieve an overall GPA of 2.0 in the major prep.**
- **Students receiving grades of below C- in two prep courses, either separate courses or repetitions of the same course, are subject to dismissal from the major.**

- Students who complete Chem 20A can move to the 14 series starting with 14B, or after taking 20A, 20B, 20L may take Chem 14C, 14CL*, 14D.
- The Chemistry 14 series is unique to UCLA – there are no equivalents at other schools and must be taken in its entirety at UCLA.

UPPER DIVISION MAJOR REQUIREMENTS

Upper Division Core Requirements	
Biochemistry	**Chem 153A** Biochem: Intro to Structure, Enzymes & Metabolism (4 units)
Genetics	**Life Science 107**: Genetics (5 units) *(not required if you completed LS4)*
Cell Biology Course	**MCDB 165A** Biology of the Cell (5 units)
Developmental Bio Course	**MCDB 138** Developmental Biology (5 units)
Molecular Biology Course	**MCDB 144** Molecular Biology of Cellular Processes (5 units)

	Laboratory Requirement (choose from #1 – 5)		
1.	**MCDB 104AL** (5 units) Research Immersion Lab in Developmental Biology		
	OR		
2.	**MCDB 187AL** (5 units) Research Immersion Lab in Genomic Biology		
	OR		
3.	**MCDB 150AL** (5 units) Research Immersion Lab in Plant-Microbe Ecology		
	OR		
4.	**MCDB 196B**❖ (4 units) Research Apprenticeship II (2nd qtr.)	**+**	**MCDB 180B*** (2 units) Scientific Analysis & Communication II
5.	**MCDB 196B, 198B/C or 199B/C****	**+**	**MCDB 145**** (4 units**)**
	See IMPORTANT NOTES on page to regarding MCDB 196/180 and 145 courses – Page 2		

Upper Division Elective Requirement for the Major	
20 units of Approved Upper Division Electives (see attached list of electives)	**5 units must be MCDB dept. course/s (category 1), 5 units may be taken from category 1 or category 2, and 10 units can be taken from category 1, 2, or 3.**

□□Please see the next page for important notes pertaining to course restrictions and what counts or does NOT count toward the major requirements or electives.□□

IMPORTANT NOTES PERTAINING TO MAJOR REQUIREMENTS

- **Any single course can be used in only ONE category on the major.**
- **Courses applied toward the prep and major requirements must be taken for a letter grade.**
- **MCDB majors are required to earn a letter grade of C in each MCDB Core Course (LS107, Chem 153A, MCDB 138, 144, 165A), and achieve a minimum overall GPA of 2.0 in the major.**
- **Students receiving grades below C in two required core courses, either in separate courses or repetitions of the same course, are subject to dismissal from the major.**

IMPORTANT NOTES regarding MCDB 196/180/145
* MCDB 180B is taken CONCURRENTLY with 196B (same for 196A and 180A).
❖ 196A/180A is a pre-requisite for 196B/180B. The second quarter (196B) is applied to your laboratory requirement. 196A/180A/180B (8u) are applied toward the 20 units of elective.
** MCDB 145 (offered in Spring only) Students must apply for the MCDB 145 seminar during Winter quarter. It must be taken with an MCDB upper division research course.

- Life Science 7A, 7B, 7C, 23L, AND **LIFE SCIENCE 107** are pre-requisites for all MCDB upper division coursework except MCDB 165A (pre-reqs: 14D or 30B and 7A, 7B, 7C).

- Any upper division MCDB course will be accepted as an MCDB elective, **EXCLUDING** MCDB 100, 104AL, 138, 144, 150AL, 165A, 187AL, 187C, 187D, 190A-C, 192A, 192B, 193, 194A, and 199.

- The MCDB department does not approve Biochemistry/MCDB or MIMG/MCDB double major petitions.

- A maximum of 4 units of approved seminar course credit may be applied to the ELECTIVES requirement. (e.g., MCDB 145, 180A, 180B, 191).

- **APPLYING INDEPENDENT RESEARCH TO MCDB MAJOR REQUIREMENTS**: To enroll in MCDB 196A/B, 199A-D, or 198A-D, students MUST be conducting research in an MCDB approved lab. A list of approved faculty mentors is available in the MCDB undergraduate office (128 Hershey Hall), and on the MCDB Undergraduate website: https://www.mcdb.ucla.edu/undergraduate-research/

- **APPLYING INDEPENDENT RESEARCH TO THE LAB REQUIREMENT (196A/B, 180A/B):** Students may apply for these courses during their third or fourth year. See the MCDB website for application materials and instructions: https://www.mcdb.ucla.edu/undergraduate/undergraduate-research/mcdb-196a-and-196b .

- **A maximum of 12 units of research (MCDB 196A – B, MCDB 199A – C, MCDB 198A – C) may be applied to the major requirements.** Please note: MCDB 196B (4u) is applied to the upper division laboratory requirement and MCDB 196A (4u) plus MCDB 199C (4u) is applied toward the ELECTIVES requirement.

- If a Research Immersion laboratory (i.e. MCDB 104AL, 150AL, 187AL) is completed, 12 units of MCDB 199A-C, or MCDB 198A-C may **ALSO** be applied to the electives. If a student takes MCDB 104BL it will be applied to the MCDB electives as well.

- Elective credit is granted for **either** Biostats 100A or Stats 100A, but not both.

Requirements for the B.S. degree established by the College of Letters & Science are listed in the UCLA General Catalog. A total of 180 quarter units are required for the degree; 60 of these 180 units must be upper division (course numbers 100-199). Check your DAR to determine your allotted maximum number of quarter units. **NOTE: The MCDB major UD requirements satisfy between 48 – 50 upper division units.**

Upper Division Elective Requirement for the Major:
The categories below correspond to the elective categories on your Degree Audit Report.

CATEGORY 1		
FIVE UNITS OF MCD BIOLOGY UPPER DIVISION ELECTIVES		
Course #	**Course Name**	**Units**
MCDB 104BL	Advanced Research Analysis in Developmental Biology	4
MCDB M130	Fundamentals of Digital Imaging and Image Processing	5
MCDB M140	Cancer Cell Biology	5
MCDB C141	Molecular Basis of Plant Differentiation and Development	5
MCDB 145	Appreciation and Critical Review of Biomedical Research	4
MCDB 146	Metabolism & Disease	5
MCDB CM156	Human Genetics	5
MCDB 160	Principles of Light Microscopy	4
MCDB 168	Stem Cell Biology	5
MCDB M175A	Neuroscience: From Molecules to Mind	5
MCDB M175B	Neuroscience: From Molecules to Mind	5
MCDB M175C	Neuroscience: From Molecules to Mind	5
MCDB 180A	Scientific Analysis and Communications I *(formerly 188A)*	2
MCDB 180B	Scientific Analysis and Communications II *(formerly 188B)*	2
MCDB 191	Variable Topics in Molecular, Cell, and Developmental Biology	2
MCDB 196A	Research Apprenticeship I (1st qtr.)	4
MCDB 198A-C	Honors Research in MCDB	4/qtr
MCDB 199A-C	Directed Research in MCDB	4/qtr

CATEGORY 2		
FIVE UNITS OF UPPER DIVISION ELECTIVES FROM MCD BIOLOGY AND ACCEPTABLE LIST OF OUTSIDE ELECTIVES		
MCD BIO Courses:		
Any additional MCDB course listed above that was NOT taken to fulfill category 1		
Course Dept. & #	**Course Name**	**Units**
Chemistry & Biochemistry		
CHEM C100	Genomics and Computational Biology	5
CHEM 153B	**NOT ACCEPTED ON THE MAJOR – DO NOT TAKE THIS COURSE**	
CHEM 153C	Biochemistry: Biosynthetic & Energy Metabolism & Its Regulation	4
CHEM 153L	Biochemistry Laboratory	4
CHEM C159	Mechanisms in the Regulation of Transcription	4
CHEM CM160A	Introduction to Bioinformatics	4
Computer Science/Computational and Systems Biology		
COM SCI CM124	Computational Genetics	4
COM SCI CM186	Computational Systems Biology: Modeling & Simulation of Biol. Systems	5
Ecology & Evolutionary Biology		
EE BIOL 184	Evolution, Development, and Disease	4
Continued on next page		

Microbiology, Immunology & Molecular Genetics		
MIMG 100L	Microbiology Lab for Professional Schools	3
MIMG 101	Introductory Microbiology	4
MIMG 102	Virology	4
MIMG 105	Biological Microscopy	4
MIMG 132	**NOT ACCEPTED ON THE MCDB MAJOR**	
MIMG 158	Microbial Genomics	4
MIMG 168	Molecular Parasitology	4
MIMG C185A	Immunology	5
Physiological Sciences		
PHY SCI 121	Disease Mechanisms and Therapies	5
PHY SCI 125	Molecular Systems Biology	5
PHY SCI C130	Sex Differences in Physiology and Disease	4
PHY SCI 174	Cell Biophysics in Physiology and Disease	5

CATEGORY 3		
TEN UNITS OF UPPER DIVISION ELECTIVES FROM MCD BIOLOGY AND ACCEPTABLE LIST OF ADDITIONAL OUTSIDE COURSES		
CATEGORY 1 OR 2 COURSES:		
Any additional MCDB or approved outside elective course/s listed above that were NOT taken to fulfill category 1 or 2		
Course Dept. & #	**Course Name**	**Units**
Biostatistics		
BIOSTATS 100A	Intro to Biostatistics	4
Ecology & Evolutionary Biology		
EEB 110	Vertebrate Morphology	6
EEB 121	Molecular Biology and Evolution	4
EEB 162	Plant Physiology	4
Human Genetics		
HUM GEN C144	Genomic Technology	4
PHY SCI 166	Animal Physiology	6
Statistics		
STATS 100A	Introduction to Probability Theory	4
NOTE: Elective credit is granted for **either** Biostats 100A or Stats 100A, but not both.		

Course number designations:

C = Course is offered concurrently to undergrad and graduate levels in the same class.

M = Listed through multiple departments (may have different numbers in each department).

CM = Offered concurrently to undergrad and grad, and offered through multiple departments.

SCHEDULING TIPS

- Not all electives are offered every year. Please consult the Schedule of Classes or the appropriate department.
- When making a course plan to meet your major requirements, please make sure you have planned for all prerequisites for any upper division course in which you plan to enroll. Courses, which count on the MCDB major, may have upper division prerequisites.
- Some electives are restricted to the home department's own majors during first pass. If you want to get into, for example, MIMG 185A, you will need to wait until your second pass because you are not an MIMG major.

Fall	Units	Winter	Units	Spring	Units

Fall	Units	Winter	Units	Spring	Grades

COMPUTING SPECIALIZATION IN MCDB

Majors in Molecular, Cell and Developmental Biology may receive a specialization in computing by:

1. Satisfying all the requirements for a bachelor's degree in the major and;
2. Completing the following course requirements:

    - Programs in Computing 10A, 10B, and 10C
    - Programs in Computing 16 (Python)
    - Stats 13 or Life Science 40 (Stats)
    - One upper division course from:
        - Computer Science CM124
        - Computer Science CM186
        - Chemistry & Biochemistry C100
        - Chemistry & Biochemistry CM160A
        - MCD BIO 187AL*
        - Physiological Science 125

    Students may overlap the upper division course for the specialization with an elective or lab requirement for the major.
    *Space in 187AL is extremely limited and computing specialization students are not guaranteed a space in 187AL simply because they plan to complete the specialization.

    Students must earn a letter grade of C or better in each required course for the computing specialization and a combined GPA of at least 2.0 in these courses to graduate with the specialization in computing