**MAJOR:** BIOLOGY: MICROSCOPY CONCENTRATION  
**DEGREE:** BACHELOR OF SCIENCE

The Microscopy concentration is for students who plan a career as a biological microscopist. Research laboratories, hospitals, pharmaceutical companies, chemical companies, food processing laboratories, and forensic laboratories are areas in which opportunities exist for microscopists.

<table>
<thead>
<tr>
<th>Montcalm Community College</th>
<th>Credits</th>
<th>Central Michigan University Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Education Requirements – Competencies</strong></td>
<td>(Require a grade of “C” or higher)</td>
<td></td>
</tr>
<tr>
<td>ENGL 100 Freshman English I</td>
<td>3</td>
<td>ENG 101 Freshman Composition</td>
</tr>
<tr>
<td>ENGL 101 Freshman English II</td>
<td>3</td>
<td>ENG 201 Intermediate Composition</td>
</tr>
<tr>
<td>COMM 210 Speech</td>
<td>3</td>
<td>COM 101 Introduction to Communication</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td>Satisfied by MATH 180 or 250 (see below)</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td></td>
<td>Satisfied by PHYS 230 (see below)</td>
</tr>
<tr>
<td>Writing Intensive</td>
<td></td>
<td>Six credits waived if MTA or MACRAO is satisfied. The remaining 6 must be completed at CMU</td>
</tr>
</tbody>
</table>

| **General Education – University Program Requirements** | |
| All MTA applicable courses require a grade of “C” or higher |

**Group I Humanities (6 – 8) from at least 2 subjects**  
MACRAO: Requires 8 hours – MTA: Requires 2 courses  
Select courses from: ENGL 195, 200, 210, 220, 221, 230, 265; FREN 120, 121; GERK 101, 102; MUSI 101; PHIL 220, 221, 222; SPAN 130 or 131; CHNS 130 or 131  
MACRAO Only: may include ARTS 120, 225; HUMN 100, 110, 200, 201, 270, 271  

| **Credits** | 6 – 8 | Various Humanities Course Credit |

**Group II Natural Sciences (4 – 8) from at least 2 subjects**  
MACRAO: Requires 8 hours (Math + Natural Science)-MTA: Requires 2 courses  
At least once course must be a lab science  
CHEM 220 College Chemistry I  
PHYS 230 College Physics I  

| **Credits** | 5 | CHM 131 General Chemistry I |
| **Credits** | 4 | PHY 130 QR & 170 College Physics I & Lab |

**Group III Social Sciences (6 – 8) from at least 2 subjects**  
MACRAO: Requires 8 hours – MTA: Requires 2 courses  
Select courses from: ANTH 260, ECON 215, 216; HIST 250, 251; POLI 240; PSYC 120; SOCI 230, 235  
PSYC 120 recommended for Pre-PT/PA students.  

| **Credits** | 6 – 8 | Various Social Sciences Course Credit |

**Group IV Studies in Culture and Diversity**  
Waived if MTA/MACRAO is satisfied  

**Mathematics (3 – 4):**  
MACRAO: Requires 8 hours (Math + Natural Science) - MTA: Requires 1 course  
Select one of the following:  
MATH 180 Precalculus  
MATH 250 Calculus I & Analytic Geometry I  

| **Credits** | 5 | MTH 130 Pre-Calculus Mathematics |
| **Credits** | 4 | MTH 132 Calculus I |

**Major or Degree Related Transferable Courses**  
CHEM 221 College Chemistry II  
CHEM 250 Survey of Organic Chemistry  
PHYS 231 College Physics II  

| **Credits** | 5 | CHM 132 General Chemistry II |
| **Credits** | 5 | CHM 342 Survey of Organic Chemistry |
| **Credits** | 4 | PHY 131 & 171 College Physics II & Lab |

FOR TRANSFER STUDENTS WHO STARTED AT A COMMUNITY COLLEGE BEFORE FALL 2016  
If you started following a previous Biology Major Transfer Guide, you may continue to follow the previous guide built around the prior biology curriculum and majors to transfer to CMU. You will need to work with a CMU academic advisor to ensure proper course sequencing. You may also choose to follow the current transfer guide built around the New Biology Curriculum.

FOR TRANSFER STUDENTS WHO STARTED AT A COMMUNITY COLLEGE FALL 2016 OR AFTER  
If you start your college career at a community college, you will follow the current transfer guide built around the new Biology curriculum and majors to transfer to CMU. If you are a dual enrolled high school student or an Early/Middle College student who will enroll at CMU as an incoming Freshman Fall 2016 or beyond you will also follow the transfer guide built around the new Biology curriculum. You will need to work with a CMU academic advisor and your current advisor to ensure proper course sequencing.

It is strongly recommended that transfer students contact CMU early in their college career to ensure proper course sequencing for their major, optimizing course scheduling, and timely degree completion at CMU. CMU College of Science & Engineering 989.774.1870.
## Major or Degree Related Courses to be Completed at CMU

### Core Courses I (20 hours)
- BIO 111 Foundations of Evolution and Diversity (4)
- BIO 112 Foundations of Cell Biology (4)
- BIO 211 Foundations of Genetics (4)
- BIO 212 Foundations of Form and Function (4)
- BIO 213 Foundations of Ecology (4)

### Core Courses II (17 - 18 hours)
- BIO 330 Light Microscopy (3)
- BIO 403 Undergraduate Research (3 – 4)
- BIO 550 Transmission Electron Microscopy (4)
- BIO 552 Scanning Electron Microscope Technique (4)
- BIO 553 Confocal Microscopy (3)

### Required Courses (3 hours)
- Select one of the following:
  - BIO 325 Biotechnology (3)
  - BIO 500 Biological Statistics (3)
  - BIO 536 Histology (3)

### Other Requirements I (20 hours)
May be satisfied at MCC with CHEM 220, 221; MATH 180 or 250; PHYS 230, 231

### Other Requirements II (4-8 hours)
May be satisfied at MCC with CHEM 250. Students who transfer CHEM 250 to CMU must select Option A in Other Requirements III.

### Other Requirements III (3 - 6 hours)
- **Option A (3 hours)**
  - CHM 421 Survey of Biochemistry (3)
- **Option B (3 hours)**
  - CHM 425 Introductory Biochemistry (3)
- **Option C (6 hours)**
  - CHM 521 Fundamentals of Biochemistry (3)
  - CHM 522 Intermediate Biochemistry (3)

### Other Requirements IV (0 hours)
Capstone Exit Exam and Survey

### General Notes
- A grade of C- or better is required for a course to transfer.
- A bachelor’s degree requires a minimum of 124 semester hours of credit. CMU will accept community college transfer credits beyond the recommended 64 semester hours; however students will need to complete a minimum of 60 semester hours from an accredited 4-year-degree granting institution. A minimum of 40 hours must be completed at the 300 level or above. A minimum of 30 semester hours of credit must be earned from CMU.
- The University Program Requirements and competencies may be fulfilled by students who satisfy the MACRAO Agreement or the MTA.
- Students are required to meet CMU Competency Requirements prior to reaching 56 credit hours. Competency requirements consist of: two Written English (composition) courses, one Oral English (communication) course, and one Mathematics course be completed with a grade of "C" or above.

Any remaining required and elective courses for a bachelor’s degree will be selected in consultation with an academic advisor to ensure that CMU degree requirements are being met.

**Effective Bulletin Year: 2016 – 2017**

---

**CENTRAL MICHIGAN UNIVERSITY**

Admissions: Warriner Hall 102 | Mount Pleasant, MI 48859 | 1-888.292.5366 Toll Free

cmuadmit@cmich.edu | [http://admissions.cmich.edu](http://admissions.cmich.edu)

CMU is an AA/EO institution, providing equal opportunity to all persons, including minorities, females, veterans and individuals with disabilities. (see cmich.edu/aao) UComm 9063