**PSM Biotechnology Program (MS & Combined) – for the 2019-2020 Academic Year**

**General scheduling information (be sure to consult your advisor)**

1) Graduation requirements:

IF YOU BEGAN before Fall 2018: a minimum of 35 credits (includes 6 credits of electives); minimum GPA of 3.0

 Scientific Communication & Lab Techniques are highly recommended & expected for graduate assistantship eligibility.

 IF YOU BEGAN FALL 2018 or later: a minimum of 37 credits; minimum GPA of 3.0

 Scientific Communication & Lab Techniques are now required & need to be taken your first Fall semester.

2) Average number of credits/semester for full-time graduate student status: 9

*3) The italics in the schedule below indicate the* ***recommended*** *semester to ensure proper preparation for later courses.*

4) Be sure to use MyPath to chart your progress through the program.

5) We have two new-ish Fall electives, one of which is part of the new Bioinformatics Genomics Certificate Program. The

 other new course is designed to address business planning & operations. See the descriptions for all on p 3.

6) Students who have completed all coursework, but have not yet graduated, must register for 1 credit of CMB 696 each

 semester for continuous registration.

7) Be sure to request a graduation audit during your second to the last semester.

8) ***Be sure to consult your advisor so your particular background can be taken into account in order ensure your success.***

**Regarding specific courses:**

1) STA 610-01 can substitute for STA 622. Unless you are experienced with statistics, we do not recommend taking

 statistics in your first semester at GVSU.

2) CMB 626 Advanced Research Applications in Nucleic Acids is offered both semesters. This is an intensive course & you

 want to be sure you have the necessary preparation. ***IF*** you do not have a good amount of laboratory experience

 before beginning the PSM program, it is often better to wait until your second year to take CMB 626 so you can take

 the two other lab courses beforehand (CMB 520 Lab Techniques & CMB 620 Cell Culture & Bioprocessing). ***CMB 626***

 ***sometimes fills quickly, so do not delay in registering for this class.*** If you cannot register because the course is full, please

 keep in close contact with the listed instructor so we can get you in.

3) Take no more than 9-10 credits during the CMB 626 Advanced Research Applications in Nucleic Acids semester.

4) The PSM 662 Seminar course requires you to have taken some courses in your discipline beforehand, so do not take

 it your first semester. You can substitute CMB 680-01 Planning & Leadership for the PSM 662 Seminar.

**Program requirements → PSM CMB Biotechnology MS, Combined → total credits required = 35 or 371**

 **Course Required courses Credits**

 CMB 5012 Scientific Communication 3

 CMB 505 Advanced Cell Biology 3

 CMB 506 Advanced Molecular Biology 3

 CMB 5202 Laboratory Techniques 3

 CMB 610 Foundations of Biotechnology 3

 CMB 620 Cell & Tissue Culture/Cell Culture & Bioprocessing now 3

 CMB 626 Advanced Research Applications in Nucleic Acids now 4

 CIS 661 Medical & Bioinformatics 3

 STA 6223 Statistical Methods for Biologists 3

 PSM 650 Ethics & Professionalism 3

 PSM 662 PSM Seminar (or CMB 680-01 Planning & Leadership) 2

 PSM 691 Internship 4

 **Subtotal Required credits 31 or 36**

 **Subtotal Electives 5 or 1**

 **TOTAL CREDITS 35 or 37**

 **1 31 required credits if you began the program *before* Fall 2018; 35 if you began Fall 2018 or later**

 **2 CMB 501 & 520 - strongly recommended if you began the program *before* Fall 2018; required if began Fall 2018 or later**

**3 STA 610-01 Statistics for Health Professions can substitute for STA 622**

**CMB elective course offerings** – Depending on your post-GVSU plans & specific interests, certain elective courses may be valuable for your career. Also, keep in mind that other departments might have graduate courses of interest to you (Biomedical Sciences (BMS), Biology (BIO), etc.).

 CMB 509 Responsible Conduct for Research 1 cr Winter

 CMB 551 Bioinformatics for Life Sciences 3 cr Fall

 CMB 552 Computer modeling of Biomolecules 3 cr Winter

 CMB 560 Genomics & Molecular Diagnostics 3cr Fall – *new-ish course! Description on next page*

CMB 585 Molecular Ecology 3 cr Winter

 CMB 680-01 PSM Planning & Leadership 2cr Fall – *new course! “ “ “*

STA 616 Statistical Programming 3 cr Winter

**Example scheduling – Combined degree students should look at the example schedule at the CMB Combined Degree link**

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester/Course** | **Credits** | **When/where** | **Additional course offerings** |
| **Fall – 1st year** |  |  |  |
| *CMB 501 Scientific Communication* | 3 | W 9-12:50, 1173 KHS |  |
| *CMB 520 Lab Techniques* | 3 | F 8-11:50, 543 CHS |  |
| 1 course | 2-3 |  | CMB 505, CMB 551, CMB 560, CMB 610, CMB 680-01 (2 cr), PSM 650, STA 610-01 OR 622, CIS 661 |
| **Total** | **8-9** |  |  |
|  |  |  |  |
| **Winter**  |  |  |  |
| *CMB 620 Cell Culture & Bioprocessing* | 3 | W 1-4:50, 543 CHS |  |
| *CMB 506 Advanced Molecular Biology* | 3 | W 6-8:50, 710 EC |  |
| 1 additional course***(\*do not take > 9-10 credits total if taking CMB 626)*** | 3-4 |  | CMB 509 (1 cr), CMB 610, CMB 552, CMB 626 (4 cr), STA 610-01, CIS 661, PSM 650, PSM, PSM 662 (2 cr), PSM 691 (up to 4 cr) |
| **Total** | **9-10** |  |  |
|  |  |  |  |
| **Spring/Summer**  |  |  |  |
| 1-2 courses |  |  | PSM 650, PSM 662 (2 cr), PSM 691 (up to 4 cr) |
| **Total** | **2-6** |  |  |
|  |  |  |  |
| **Fall – 2nd year** |  |  |  |
| *CMB 505 Advanced Cell Biology* | 3 | Th 6-8:50, 203E DEV |  |
| *CMB 626 Advanced Research Applications in Nucleic Acids* | 4 | MW 1-3:50, 543 CHS |  |
| 1 additional course***(\*do not take > 9-10 credits total if taking CMB 626)*** | 2-3 |  | CMB 551, CMB 560, CMB 610, CMB 680-01 (2 cr), PSM 650, PSM 662 (2 cr), PSM 691 (up to 4 cr), STA 610-01 OR 622, CIS 661 |
| **Total** | **9-10** |  |  |
|  |  |  |  |
| **Winter** |  |  |  |
| 3 additional courses***(\*do not take > 9-10 credits if taking CMB 626)***  | 9 |  | CMB 509 (1 cr), CMB 610, CMB 552, CMB 626, STA 610-01, CIS 661, PSM 650, PSM 691 (up to 4 cr) |
| **Total** | **~ 9** |  |  |
|  |  |  |  |
| **Spring/Summer**  |  |  |  |
| Courses if necessary | 2-6 |  | PSM 650, PSM 662 (2 cr), PSM 691 (up to 4 cr) |

**Required & elective courses – Be sure to confirm the time & location of courses in Banner.**

**Offered Fall only**

CMB 501 Scientific Communication (W 9-12:50, 1173 KHS)

CMB 505 Advanced Cell Biology (Th 6-8:50, 203E DEV)

CMB 520 Lab Techniques (F 8-11:50, 543 CHS)

CMB 551 Bioinformatics for Life Sciences (T 6-8:50, 204A DEV)

CMB 560 Genomics & Molecular Diagnostics (W 6-8:50, 420 EC) – *newer course!*

CMB 680-01 PSM Planning & Leadership (2 cr; T 4-5:50, 203E DEV) – *newer course!*

STA 622 Statistical Methods for Biologists (W 6-8:50, A2111 MAK)

**Offered Winter only**

 CMB 509 Responsible Conduct of Research (T 10-10:50, 1179 KHS)

 CMB 506 Advanced Molecular Biology (W 6-8:50, 710 EC)

CMB 552 Modeling of Biomolecules (M 6-8:50, 233 CHS)

 CMB 620 Cell Culture & Bioprocessing (W 1-4:50, 543 CHS)

**Offered multiple semesters**

CMB 610 Foundations in Biotechnology – Fall (Th 6-8:50) & Winter (M 6-8:50), 710 EC

CMB 626 Adv Research Applications in Nucleic Acids – Fall (MW 1-3:50) & Winter (MW 9-11:50), 543 CHS

PSM 650 Ethics & Professionalism – Fall (W 6-8:50, 418 EC), Winter (online), Summer (MW 6-8:50, 419 EC OR

 online for the entire summer); fulfills the requirement for Responsible Conduct of Research training

PSM 662 Seminar (2 cr) - Fall & Winter (MW 5-5:50, 617 EC) & Spring (T/Th 6-8:50, 617 EC)

PSM 691 Internship (minimum 4 cr) – *these don’t need to be taken all in a single semester*

CIS 661 Intro to Medical & Bioinformatics – Fall (M 6-8:50, 612 EC OR hybrid with select T 6-8:50 sessions) &

Winter (T 6-8:50, 612 EC)

STA 610-01 Applied Statistics for Health Professions – Fall (Th 6-8:50, KEN 122), Winter (W 3-5:50, 209/189 CHS)

**New Fall courses & certificate programs**

**CMB 509 Responsible Conduct of Research (1 cr)**

Consists of modules covering the principles and rules for best practice in research using lectures, discussions, case studies, and interactive exercises. Provides students with professional and ethical reasoning skills needed for success in their research and scholarly inquiry. Cross-listed with CMB 409. Offered winter semesters.

**CMB 560 Genomics & Molecular Diagnostics (3 cr)**

Provides principles & applications of genomics & molecular tools for disease diagnostics. Topics include molecular & computational tools of genomics, genome structure, diagnosis of disease, gene expression, & biological networks. Cross-listed with CMB 460. Offered fall semester.

 Note – this is one of three core courses for the Graduate Certificate in Bioinformatics & Genomics.

**CMB 680-01 PSM Planning & Leadership (2 cr)**

This course will provide PSM students a general overview of business management & organizational planning,

effective leadership strategies & decision-making skills, selecting (& being) a valuable employee, employee

engagement & motivation, managing employee relations, finance & accounting basics, communication & team

work in the workplace, customer service, quality management, & other current and relevant hot topics. Students

will learn legal & practical considerations related to business planning & operations as they begin their careers. ***This course can substitute for the PSM 662 seminar; your advisor will note this substitution when they do your graduation audit so the substitution will not show up in MyPath until your audit is complete.***

**Graduate Certificate in Bioinformatics & Genomics**

The certificate will be earned by successfully completing a minimum of four courses (12 credits). The three core courses are CMB 551 Bioinformatics for Life Sciences (Fall), CMB 560 Genomics and Molecular Diagnostics (Fall), & CMB 552 Computer Modeling of Biomolecules (Winter). The fourth class is an elective chosen from a group of 11 courses offered by several departments such as Biology, CMB, Statistics, & Computer & Information Systems. Note that your STA requirement as a CMB PSM Biotechnology student will fulfill this certificate elective requirement. See the CMB website for more information: <https://www.gvsu.edu/cmb/certificates-93.htm>

*[Please report any errors/discrepancies in this document to Margaret Dietrich.]*