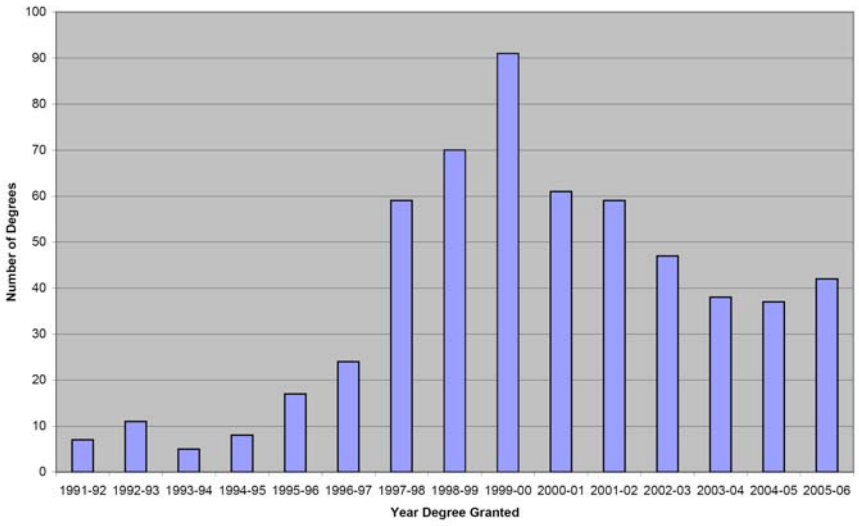
PROGRAM ASSESSMENT PLAN - 2007
UNDERGRADUATE MAJOR IN **MEDICALMICROBIOLOGY & IMMUNOLOGY**

PROGRAM GOALS: The undergraduate major in Medical Microbiology and Immunology (MMI) provides a basic theoretical and technical understanding of the structure, molecular biology, pathogenesis, epidemiology; and laboratory identification of the different microorganisms that cause human disease, as well as host immune responses to them. This is accomplished through formal lectures, laboratory experiences, directed research studies and presentations wherein the students learn the vocabulary and concepts of our science and related sciences with the aim of developing critical thinking, problem solving skills and communication skills which will prepare them for life-long learning. The goals of our recipients of a baccalaureate degree with a major in MMI include entry level professional position, admission to professional school, or admission to graduate school for advanced study.

Figure1: MMI Baccalaureate Degrees - Past 15 years



BACKGROUND: The number of degrees conferred for the past 15 years is shown in Figure 1 (data from Registrar, UW-Madison). In 1999 Medical School Administration instructed the department to enroll no more than 60 new majors annually because of budgetary constraints. Since then we have instituted an application process for admission to the MMI major, these are outlined on our web site http://www.medmicro.wisc.edu/undergraduate/admissions/index.html. Faculty and instructional academic staff are responsible for the teaching of undergraduate students, graduate students in addition to the teaching of medical students. Our faculty participate in the nationally rated Microbiology Doctoral Training Program as well as other graduate training programs on campus both at administrative and teaching levels and are heavily involved in the teaching of MMI 701 and Med Science 702 (Infection and Immunity) courses in the second year of the School's medical student curriculum. It should be noted MMI programs including salaries for faculty and academic staff are funded by the School of Medicine and Public Health (SMPH). In the late 199Os the department considered transferring the major from L&S to the SMPH, but rejected the idea because students enrolled in the major should have the broad educational experience afforded by having the major located administratively in L&S.

COURSE OBJECTIVES: The curriculum of the undergraduate major in MMI has been assessed and modified to meet student needs on numerous occasions beginning in 1994. Each time this was done, we also reviewed the prerequisites required for admission to our program, as well as non-departmental courses required for our majors and made appropriate changes as necessary. Two courses, MMI 341 (Immunology) and MMI 575 and (Biology of Viruses) were created because it was obvious that our students were unprepared to take advanced courses in these disciplines available to them at that time. These two courses were later added as requirements for the major.

Other courses, MMI 460 (Techniques in DNA Science for Microbiologists), MMI 554 (Bioterrorism & Emerging Infectious Diseases) and MMI 696 (Critical Thinking in Microbiology) were added to the curriculum to broaden the educational experience of our majors by addressing significant issues not covered by other courses in our curriculum (see appended item 1 for a complete listing of courses that have been added to the curriculum for our majors).

In 2001 the MMI Curriculum Review Committee compared our program at that time with undergraduate microbiology programs in 15 different schools. This involved discussions concerning similarities and differences and an assessment of changes that might enhance our program. In reviewing our program it became apparent that we have a dynamic curriculum and that we provide a large number of courses on diverse topics for students in our major. This includes laboratories which are variably offered in other programs. The committee felt that our majors were being offered a wide range of courses on the various pathogenic agents and the host immune response to these agents at a high level. Subsequently, in 2003 after publication in the Undergraduate Catalog, the curriculum was amended to require all MMI majors to take courses on the four categories of human pathogens, including bacteria, viruses, fungi and parasites. As our curriculum continues to evolve to meet the needs of our majors, we anticipate making such curricular comparisons with programs at other institutions on an ongoing basis in order to further improve our program at the UW-Madison. More recently, we have compared our program with the American Society for Microbiology's (ASM) Curriculum Recommendations: Microbiology Majors Program. Considering that the scope of these recommendations covers the broad field of microbiology (food, environmental, industrial, etc.), whereas our major is specifically concerned with Medical Microbiology and Immunology, our program compares favorably with the ASM recommendations which can be seen on the Web at **http://www.asm.org/Education/index.asp?bid=10054**.

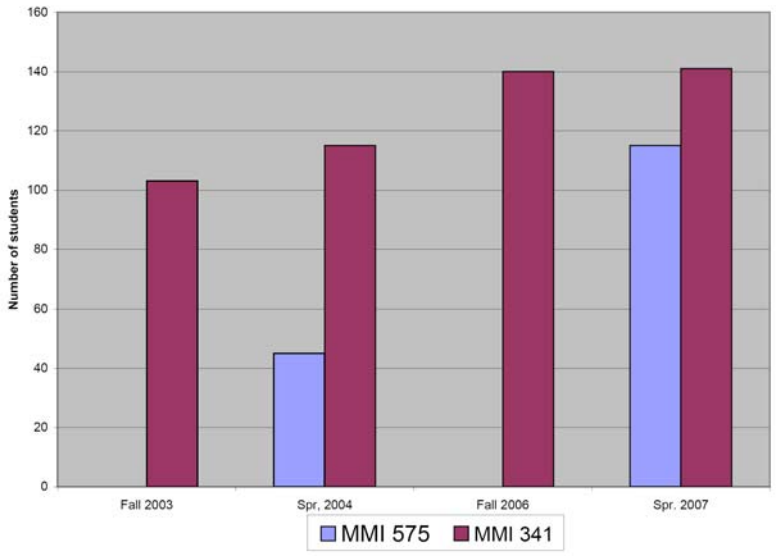
In our recent **instructional survey** all courses taught in the curriculum for MMI majors have objectives in keeping with the goals of the program as stated above (see appended items 2 and 3). Many of these courses also have behavioral objectives for individual lectures or other educational components of a course. Behavioral objectives inform the student what they are expected to do, thereby taking the mystery out of what they are held accountable for. The committee is considering plans to offer a workshop on writing and using course behavioral objectives to interested teaching staff.

Although many of the courses in the major utilize formal lectures, every effort is made to make them interactive, with time for scheduled discussion groups, student presentations and field trips. For example, in MMI 554 (Bioterrorism and Emerging Infectious Diseases) a panel comprised of media people from the press, radio and television meet with the students to present what the media does to inform the public and to answer questions about such things as how they go about this while at the same time maintaining their integrity and avoiding conflicts of interest. This particular course arose from two MMI 677 Topic courses, which allowed for adjustments and modifications as they evolved into a single formal course. MMI 554 heavily involves people from the Wisconsin State Laboratory of Hygiene who are active on the front lines of outbreaks, which gives our students an opportunity to meet public health professionals. Qualified students are encouraged to complete **honors** in the major and have the opportunity to write an honors thesis. Majors are also encouraged to have a research experience prior to graduation. In the years 2004 through fall 2006, on average, 20 students had MMI 699 (Directed Study) experiences in our MMI laboratories in each semester; and 2-5 MMI students have been awarded Hilldale Undergraduate/Faculty Research Fellowships each of those years.

As is the case for all formal courses taught at the University of Wisconsin, our courses have student evaluations which are helpful in upgrading our courses. The Associated Students of Madison (another ASM) periodically collects and posts course evaluations for most UW courses to help students select classes during registration. The only posting for MMI is for spring 2005 (appended item 4). We plan to incorporate the four categories used by ASM (stimulating, organized, available and overall) into the MMI on-line evaluation forms and post results for each semester on the MMI undergraduate web page.

Lacking a Student Services Coordinator, we are fortunate to have 3 instructional academic staff dedicated to advising our students. We want to point out that these advisors do academic advising, career counseling and manage ISIS Timetable submissions for the department in addition to having heavy teaching responsibilities. Each serves as course director and instructor in one or more of our undergraduate courses each semester.

Figure 2: Increases in number of students in newer MMI courses



Recently we have realized that in addition to teaching a service course to students in the Physician Assistant program which falls under our responsibility as a SMPH department, we have had an ever increasing number of non-major students taking courses required for our majors so that they outnumber our majors in formal lecture courses, as well as in laboratory courses (see Fig. 2). Because funding of undergraduate instruction through the School's Mission Aligned Management Allocation (MAMA) process is based on cutoff totals of enrolled students (25, 100, 150), teaching numbers of students between these cutoff amounts is not funded by MAMA. For example, MMI receives the same dollars for teaching a course to 26 students as it would for teaching that same course to 95 students.

ASSESSMENT OF STUDENT PERFORMANCE: Student performance to achieve program level goals is focused on how students perform in the core and elective courses offered in the major, to attain the program goals as stated above. The materials used to teach our majors range from textbooks and formal lectures, papers and group presentations to the use of current literature and Pod casts. Similarly, a variety of evaluation instruments, including objective type questions, essays, and oral presentations are used to determine whether our majors are achieving course objectives. An overview of the materials used in our courses to teach our students and how their performance is evaluated is shown in appended item 5.

All of our majors are required to take MMI 302, Medical Microbiology Laboratory either in the junior or senior year. At that time they are asked for their written expectations of what the major will achieve for them as well as their career goals (see appended item 6).

We are developing 2 new instruments to "indirectly" evaluate student achievement "from a distance". The MMI **graduation survey** will be posted on-line this May 2007 (see appended item 7). With the aim of achieving good compliance, we will seek student cooperation by sending out timely e-mail notices to remind students to complete this survey.

We also intend to utilize a recent UW-Alumni list to contact MMI graduates for an on-line survey 5 and 10 years post graduation. We realize that such surveys present a challenge for most majors' programs on campus. Accordingly, we plan to contact other departments both on campus and at other institutions that have been successful in conducting post-graduation surveys for insight on how to increase compliance for these types of surveys.

Our most recent "graduate survey" was a mailing in 1997 (using a list obtained from UW Alumni) to 300 MMI graduates. With 129 alumni responding, 59% continued their education, while 41% sought employment following graduation. Assessment of the "perception of educational quality of MMI program" compared to peers and employer expectation are shown here rated on a one to five scale, with **one** being the **highest** (see Fig. 3)**.** Obviously, the information obtained is quite useful and indicates a definite need for ongoing post-graduation surveys. Data on level of advanced degrees from a more recent group from1993-1997 is appended item 8.

Figure 3: Results of 1999 graduate survey

	Compared to peers	Compared to employer expectation
Knowledge of Medical Microbiology	1.5	1.6
Knowledge of Immunology	1.8	1.9
Performance of laboratory techniques	1.6	1.6
Overall training	1.7	1.8

NEXT STEPS: On February 16, 2007, this report was submitted by MMI's Undergraduate Curriculum Committee to the MMI faculty for review and approval; the report was unanimously approved. The approved report was sent, on March 8, 2007 to Dr. Elaine Klein, Assistant Dean and Director, Academic Planning, Program Review and Assessment, UW-Madison College of Letters and Science for her review and approval.

We intend to review the curriculum for our undergraduate majors in Medical Microbiology and Immunology on a bi-yearly basis to ensure that we are meeting program goals, as well as to maintain the dynamic nature of our curriculum, adding new courses as needed. This will involve program and course review by faculty, comparison with similar programs in other institutions and taking into consideration ASM's curriculum recommendations for undergraduate majors in microbiology and immunology. We will review both "direct" and "indirect" student evaluations and use the information gained by graduation surveys to recommend changes in our curriculum where appropriate. Such recommended changes will be submitted to the faculty for their approval prior to implementation.

Respectfully submitted by the MMI Undergraduate Curriculum Committee,

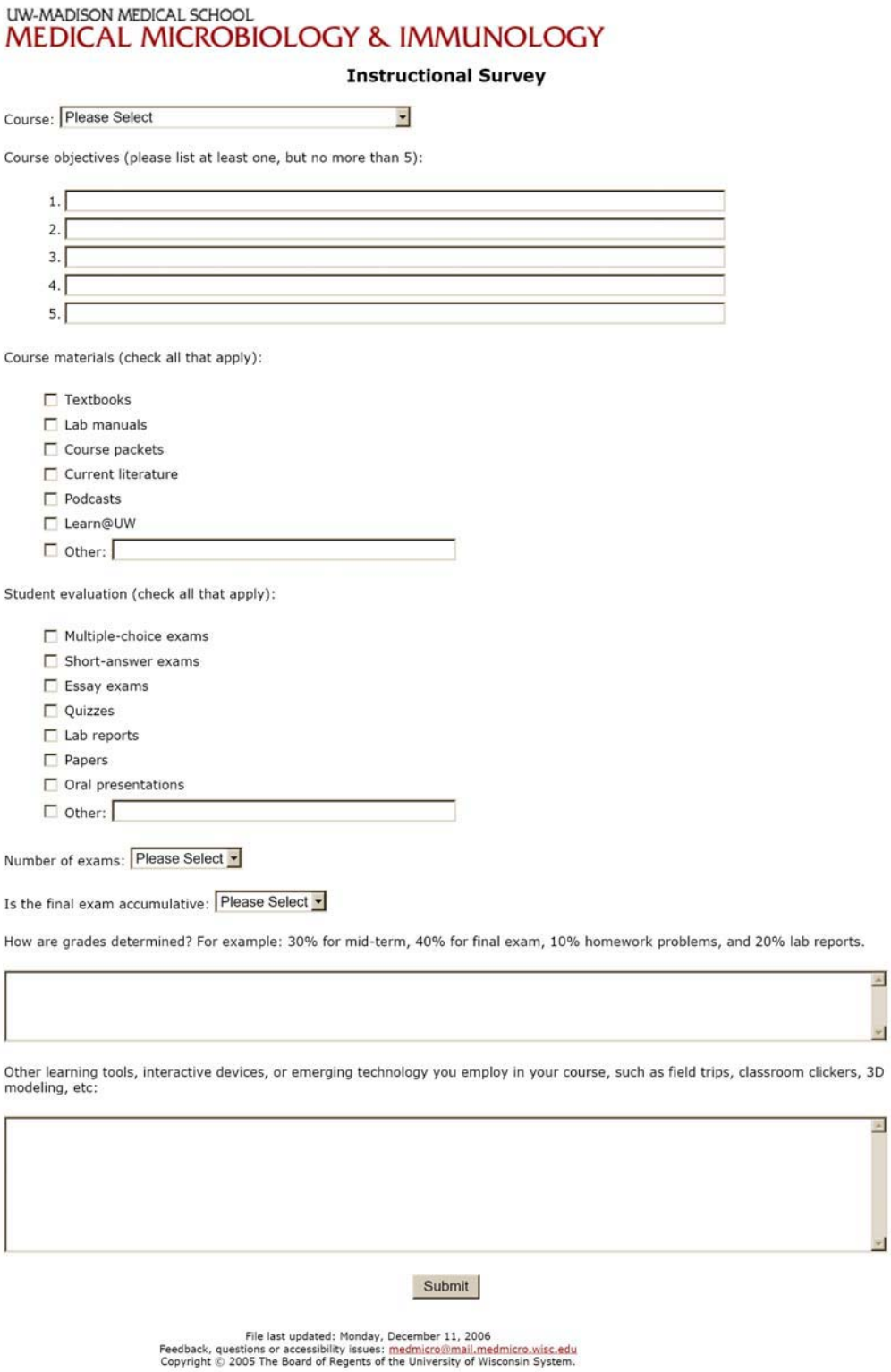
Bill Weidanz, Chair
Joanne Weber
Janet Schrader

Appendix 1:

NEW MMI Undergraduate courses – first available:

1994 – Spring	MMI 341	Immunology	2 credit	Elective
1997 – Spring and Fall	MMI 341	Immunology	2 credit	Required
2003 Spring and Fall	MMI 341	Immunology	Change to 3 credit	Required
1996 – Spring	MMI 575	Biology of Viruses	2-3 credits	Elective 1997
2001 - Spring	MMI 575	Biology of Viruses	Change to 2 credits	Required 2003
2002 - Fall	MMI 554	Emerging Infectious Diseases & Bioterrorism	2 credit -- were TWO Topics courses MMI 677 for 3 years	Elective 2003
2001 - Summer	MMI 460	Techniques in DNA Science for Microbiologists	3 credits was a Topics MMI 677 for 3 years	Elective
2006 – Fall	MMI 696	Formerly Sr. Seminar Now: Critical Thinking in Microbiology	Sr, Seminar was 1 cr. Now 3 credit	Required before 1999, Now elective

Appendix 2:



UW-MADISON MEDICAL SCHOOL
MEDICAL MICROBIOLOGY & IMMUNOLOGY

Instructional Survey

Course: Please Select

Course objectives (please list at least one, but no more than 5):

1.
2.
3.
4.
5.

Course materials (check all that apply):

- ☐ Textbooks
- ☐ Lab manuals
- ☐ Course packets
- ☐ Current literature
- ☐ Podcasts
- ☐ Learn@UW
- ☐ Other:

Student evaluation (check all that apply):

- ☐ Multiple-choice exams
- ☐ Short-answer exams
- ☐ Essay exams
- ☐ Quizzes
- ☐ Lab reports
- ☐ Papers
- ☐ Oral presentations
- ☐ Other:

Number of exams: Please Select

Is the final exam accumulative: Please Select

How are grades determined? For example: 30% for mid-term, 40% for final exam, 10% homework problems, and 20% lab reports.

Other learning tools, interactive devices, or emerging technology you employ in your course, such as field trips, classroom clickers, 3D modeling, etc:

Submit

File last updated: Monday, December 11, 2006
Feedback, questions or accessibility issues: medmicro@mail.medmicro.wisc.edu

https://www.medmicro.wisc.edu/surveys/instructional/index.html

Appendix 3:

Results from Instructional Survey (appendix 2)
Learning objectives for required MMI (and MMI taught elective) courses

MMI required courses:

MMI 301 – Pathogenic Bacteriology

- Understand bacterial cell structure, physiology and genetics relevant to bacterial pathogens.
- Understand aspects of immune response relevant for combatting bacterial infections and immuno-preventive measures.
- Survey of important bacterial diseases of humans and select animal pathogens; understand the epidemiology, transmission, and relevant host cell biology as it relates to pathogenic mechanisms of bacterial pathogens.

MMI 302 – Medical Microbiology Laboratory

- Understand the importance of safety practices (aseptic techniques), diagnostic methods to isolate and identify medically important bacterial, fungal and viral infections.
- Recognize body sites where specific organisms are found as normal indigenous flora and possible pathogens at these and at other sites. Understand other sources of infectious agents (environmental, food-borne, zoonotic pathogens, etc.).
- Work collaboratively in groups to improve communication skills.
- Improve logical and rational thinking by working with data analysis in lab exercises and case studies.

MMI 341 - Immunology

- Introduction to innate and adaptive immunity

MMI 575 – Biology of Viruses

- Introduce students to biology of viruses, what viruses are and how they replicate, cause disease, prevent infection, and viral emergence.

MMI 410 – Medical Mycology

- Survey of pathogenic fungi and diseases they cause: biology, pathogenesis, epidemiology, clinical course, diagnosis, treatment. Invited lectures by experts in the field on campus
- Use critical evaluate of research in medical mycology when writing a student paper.
- Work collaboratively with a group on shared topic, presentation skills by each student as part of group, making presentation to entire class.

MMI elective courses:

MMI 351 – Parasitology Lab.

- Learn characteristics and life cycles of protozoan and metazoan parasites; and the human and animal diseases associated with parasites.
- Learn to identify parasites on microscope slides using a microscope.

MMI 412 – Medical Mycology Lab.

- Discuss current incidence and impact/prognosis of patients with fungal infections; understand the ecology of medically important fungal pathogens, groups at risk for infections and transmission studies.
- Utilize problem-solving skills and how to use reference materials in (open-book) exams.

MMI 460 – Techniques in DNA Science for Microbiologists

- Allow students to take responsibility for all aspects of a research experiment
- Teach students the basic techniques used in DNA science

MMI 529 – Immunology Lab.

- Introduction to laboratory procedures in immunology

MMI 554 – Emerging Infections and Bioterrorism

- Students should learn the basic concepts of why certain infectious diseases “emerge”.

MMI 603 – Clinical and Public Health Microbiology

- Provide students a connection between academic knowledge of bacteriology and the microbiology of the patient in the real world

MMI 696

- Teach students to critically evaluate research in medical microbiology and immunology

Appendix 4:

http://apps.asm.wisc.edu/evals/spring2005/frame01.htm

Medical Microbiology and Immunology

Spring 2005

Unless the description on the page says otherwise, these evaluations use a 5 point scale with 5 as the highest score.

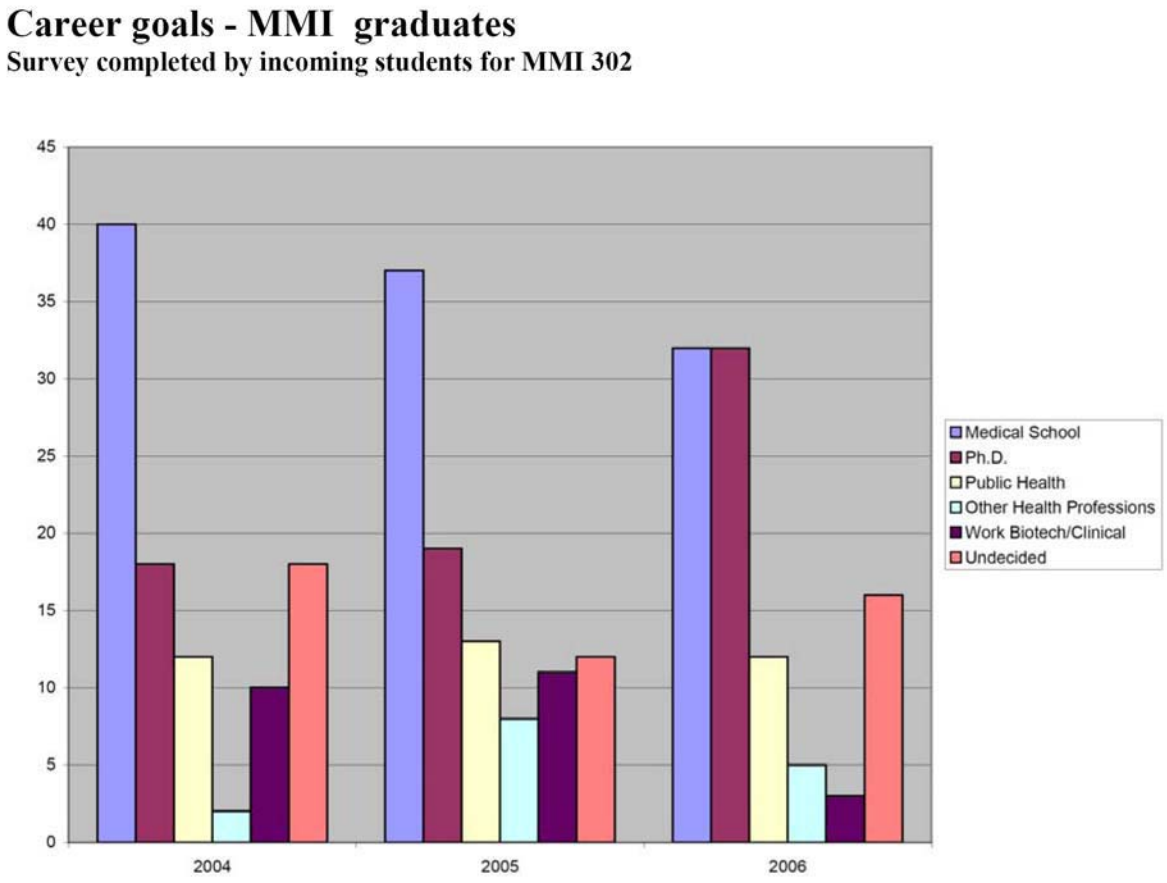
Course #	Title	Instructor	Sample Size	Stimulating	Organized	Available	Overall	Overall S.D.*
341	Immunology	Manning	45	4.49	4.48	4.77	4.80	n/a
351	Parasitology Laboratory	Schrader	23	n/a	4.30	4.61	4.26	n/a
410	Medical Mycology	Woods	35	4.00	4.31	4.23	3.94	n/a
412	Medical Mycology Lab	Weber	8	4.00	4.13	4.38	4.00	n/a
529	Immunology Lab	Manning	6	4.33	4.33	4.00	4.17	n/a
575	Biology of Viruses	Schultz-Cherry	52	n/a	3.85	4.12	4.04	n/a
677	Adv Topics-Medical Microbiology	n/a	10	4.20	4.20	n/a	4.20	n/a

***S.D.=Standard Deviation, the explanation for this is on the main course evaluations page**

Appendix 5

Course Number	Course Name	Material	Exam type or Assessment	# of Exams	Accum. Final	Grade determination
301	Pathogenic Bacteriology	Text LearnUW - lecture (lec) PPT (POWERPoint)	Multiple Choice = MC Short answer = Short	4	No	Each exam – 25 %
302	Medical Microbiology Laboratory	Text Course pkt – lec & lab LearnUW – Current lit.	MC, Short, Discussion/Orals	5	No	Each exam - 17% (total 85%) Orals/discussions - 15%
341	Immunology	Text Pod cast LearnUW	MC, Short Essay, Quizzes	3	Yes	Each exam - 20% Quizzes – 20% Problem sets – 20%
351	Parasitology Laboratory	Course pkt - lab Learn UW - Current lit.	Short 2 Quizzes, Take-home	3	No	Curved grades
410	Medical Mycology	LearnUW-- lec. PPT LearnUW – Current. lit.	MC, Short Paper Group presentation	2 Paper Present	No	Each exam - 35% Paper – 15% Presentation - 15%
412	Medical Mycology Lab.	Course pkt. – lec & lab	Open-book	2	No	Each Exam - 35% Unknowns – 30%
460	Techniques in DNA Science for Microbiologists	Course pkt. LearnUW – Current lit. Instruction manuals	Lab Reports Group projects	0	No	Attendance Participation Lab Reports
529	Immunology Laboratory	Course pkt. – lec & lab Current literature Commercial catalogs	Lab Reports Presentation	0	No	Lab Reports
554	Emerging Infections and Bioterrorism	Current literature Websites	Short Essay Field-trip, Disc.	2	No	Exam #1 – 35% Exam #2 – 50% Attendance – 15%
575	Biology of Viruses	Text LearnUW – Current. Literature	MC, Short Essay	3	**Yes**	Two exams – 30% each Final – 35% Homework – 5%
603	Clinical and Public Health Microbiology	Course pkt. Current literature	MC	3	No	Each Exam – 33%
696	Critical Thinking in Microbiology	Current literature Primary research papers	Papers Presentations	1	No	Skill of student to evaluate research

Appendix 6:


Career goals - MMI graduates
Survey completed by incoming students for MMI 302
45
40
35
30
25
20
15
10
5
0
2004
2005
2006
Medical School
Ph.D.
Public Health
Other Health Professions
Work Biotech/Clinical
Undecided

Appendix 7

MEDICAL MICROBIOLOGY & IMMUNOLOGY

MMI Undergraduate Major Graduation Survey

The campus has asked our department to give graduating seniors an opportunity to evaluate our undergraduate program. Your input will help us improve our program for incoming students, so we ask that you provide as much detail as possible regarding your experiences during your tenure as an MMI major.

The survey has been split up into three parts. If you do not have time to respond to all three now, you may complete what you can now and come back when you have time, and continue from the point at which you left off. Please keep in mind that your responses are not saved until you hit the "submit" button. You may leave any question blank that you do not wish to answer.

Your UW NetID is not associated with the survey data; it is only used to track which parts of the survey you've completed and to prevent students who are not graduating from accessing this system.

When you are ready, please begin with part 1.

Graduation Survey Sections

- Part 1 – Postbaccalaureate Plans (5 questions)
- Part 2 – Your experience in the Major (8 questions)
- Part 3 – Website, Advising, and UWAA (7 questions)

File last updated: Thursday, February 15, 2007
Feedback, questions or accessibility issues: medmicro@mail.medmicro.wisc.edu

https://www.medmicro.wisc.edu/surveys/graduation/index.html

UW-MADISON MEDICAL SCHOOL
MEDICAL MICROBIOLOGY & IMMUNOLOGY

MMI Undergraduate Major Graduation Survey
Part 1 – Postbaccalaureate Plans

Have you applied to any professional schools?

○ Yes ○ No

If yes, please indicate what type of professional schools:

	Applied	Accepted	Will Attend
Graduate School Master's Program	☐	☐	☐
Graduate School Doctoral (Ph.D.) Program	☐	☐	☐
Public Health Program Master's Program	☐	☐	☐
Public Health Doctoral (Ph.D.) Program	☐	☐	☐
Medical School (MD)	☐	☐	☐
Medical School (DO)	☐	☐	☐
Other: Please specify...	☐	☐	☐

Are you still applying to postbaccalaureate educational programs?

○ Yes ○ No

Have you sought employment?

○ Yes ○ No

If yes, please indicate what type of employer:

	Applied	Received Job Offer	Accepted Offer
Medical	☐	☐	☐

Biotechnological	☐	☐	☐
Pharmaceutical	☐	☐	☐
Public Health	☐	☐	☐
Academic	☐	☐	☐
Other: Please specify...	☐	☐	☐

Submit and continue to part 2...

File last updated: Thursday, February 15, 2007
Feedback, questions or accessibility issues: medmicro@mail.medmicro.wisc.edu

UW-MADISON MEDICAL SCHOOL
MEDICAL MICROBIOLOGY & IMMUNOLOGY

MMI Undergraduate Major Graduation Survey
Part 2 – Your experience in the Major

Why did you choose the MMI major?

Which of the following were instrumental in choosing the MMI major (check all that apply)?

- ☐ SOAR
- ☐ Other students
- ☐ MMI advisor
- ☐ Advisor from the Letters and Sciences Advising Center
- ☐ UW Undergraduate Catalog
- ☐ MMI website
- ☐ Majors Fair
- ☐ Other: Please specify...

Did you double-major?

○ Yes ○ No

If yes, what was your other major?

Do you feel you had an adequate opportunity to apply classroom knowledge in settings such as laboratory classes, research, or internships?

○ Yes ○ No

Was there any subject of interest to you for which there was no lecture and/or laboratory class available?

○ Yes ○ No

If yes, please describe what material you feel should have been covered:

How useful or important were each of the following required courses? Please do not judge the courses comparatively, rather rate them independently.

		Somewhat	Unimportant or	Unnecessary or

	Very important or very useful.	important or possibly useful.	No opinion	not terribly useful.	of no value whatsoever.
MMI 341 Immunology	○	○	○	○	○
MMI 301 Pathogenic Bacteriology	○	○	○	○	○
MMI 302 Medical Microbiology Lab	○	○	○	○	○
MMI 350 Parasitology	○	○	○	○	○
MMI 410 Medical Mycology	○	○	○	○	○
MMI 575 Biology of Viruses	○	○	○	○	○

How useful or important were the following elective laboratories? Again, please rate them independently.

	I did not take this course.	Very important or very useful.	Somewhat important or possibly useful.	No opinion	Unimportant or not terribly useful.	Unnecessary or of no value whatsoever.
MMI 351 Parasitology Lab	○	○	○	○	○	○
MMI 412 Medical Mycology Lab	○	○	○	○	○	○
MMI 460 Tech. in DNA Science for Microbiologists	○	○	○	○	○	○
MMI 529 Immunology Lab	○	○	○	○	○	○
BMolChem 504 Human Biochemistry Lab	○	○	○	○	○	○
MMI 699 Directed Study	○	○	○	○	○	○

Please rate your overall satisfaction with the MMI major:

○ Exceedingly satisfied ○ Very satisfied ○ Moderately satisfied ○ Dissatisfied ○ Exceedingly dissatisfied

How prepared do you feel for your next career step?

○ Very well prepared ○ Well prepared ○ Moderately prepared ○ Poorly prepared ○ Very poorly prepared

Submit and continue to part 3...

File last updated: Thursday, February 15, 2007
Feedback, questions or accessibility issues: medmicro@mail.medmicro.wisc.edu

UW-MADISON MEDICAL SCHOOL
MEDICAL MICROBIOLOGY & IMMUNOLOGY

MMI Undergraduate Major Graduation Survey
Part 3 – Website, Advising, and UWAA

Did you visit the MMI website?

- Yes
- No

If yes, did you find the information useful?

- Yes
- No

Is there any information that you feel should be included on the MMI website?

How often did you meet with your assigned faculty advisor?

- Never
- Only once
- Once a year
- Once a semester
- Once a month
- Other: Please specify...

Please describe any changes we could make to improve MMI undergraduate advising:

Will you be joining the UW Alumni Association (UWAA)?

- Yes
- No

We occasionally send out announcements to MMI alums. If you won't be joining UWAA and would like to be added to that announcement list, please provde an email address where you can be reached in the future. That email address will be stored in a separate database and will not be associated with this survey. The MMI Department adheres to the UW's privacy policy and does not disseminate contact information to any company or organization outside of the UW.

Future email:

Submit Completed Survey

File last updated: Thursday, February 15, 2007
Feedback, questions or accessibility issues: medmicro@mail.medmicro.wisc.edu

Appendix 8:

MMI graduates from 1993-1997