## DEPARTRMENT OF <br> BLOLOGICAL ScIENCES

## BS DEGREE IN BIOMEDICAL SCIENCES

NMAT IS TME PROGRAN ABOUT? An Advanced Science-based Pre-medical Preparation

More Breadth and Rigor
Attracting the Most Capable Students

## WMY WI MNANT TO OFFER CTB

## - DEMAND

- OUR STUDENT BASE
- EMERGING TRENDS
- STAYING COMPETITIVE
- OUR LONG-TERM COMMITTMENT TO PRE-MEDICAL EDUCATION


## DEMAND:

## Instruction by SCH <br> (Student Credit Hours)

## Academic Mission by U/G Majors



## OIRA ESTIMATES OF GROWTH IN U/G BIOLOGY MAJORS TO 2015



ENROLLMENTS IN BIOLOGICAL SCIENCES NATION-WIDE CONTINUES TO INCREASE

TRAINING IN BIOLOGICAL SCIENCES PROVIDES AN IMPORTANT FOUNDATION FOR ACADEMIC AND VOCATIONAL TRACKS

DEMAND FOR BIO-SCIENCTISTS IN INDUSTRY IS INCREASING RAPIDLY AND IS PREDICTED TO CONTINUE FOR AT LEAST 8-10 YEARS

NATION-WIDE THE DEMAND FOR MEDICAL TRAINING IS INCREASING AND SO IS THE DEMAND FOR QUALITY PRE-MEDICAL EDUCATION

OUR STUDENT BASEA

## WE ALWAYS SEEK TO FIND OUT WHO OUR STUDENTS ARE AND WHAT ARE THEIR GOALS. VERY RECENTLY WE SURVEYED OUR ENTIRE U/G STUDENT POPULATION:

DO YOU CONSIDER YOURSELF A PRE-MEDICAL STUDENT?

YES $=78 \%$
ARE YOU PLANNING TO CONTINUE YOUR EDUCATION IN GRADUATE OR PROFESSIONAL SCHOOL?

YES = 96\%

OUR STMDENT BASE:

# WE HAVE A DISTINCT STUDENT BASE. NOT INTERCHANGEABLE WITH STUDENTS IN OTHER PROFESSIONAL TRACKS: THEY LIKE BIOLOGY AND THEY LIKE SCIENCE. 

A VERY SUBSTANTIAL PORTION OF OUR STUDENTS COME TO US FOR PRE-MEDICAL EDUCATION

OUR STUDENTS ENJOY THE BENEFIT OF A BROAD BIOLOGICAL SCIENCE EDUACATION AND LIKE BIOLOGICAL RESEARCH.

## OUR STMDENT BASE:

FOR ALL THESE REASONS:

WE STRIVE TO OFFER THE VERY BEST PREMEDICAL EDUCATION TO OUR U/G STUDENTS

WE DO NOT WANT TO TURN OUR BIOLOGY DEGREES COMPLETELY TO PRE-MEDICAL DEGREES

THE AMERICAN ASSOCIATION OF MEDICAL COLLEGES (AAMC) HAS RECENTLY CONDLUDED SEVERAL YEARS OF STUDY ON MEDICAL SCHOOL EXPECTATIONS AND PROVIDES RECOMMENDATIONS FOR FUTURE ADMISSION EXAMS (MCAT) AND PREMEDICAL PREPARATION.

THIS IS INDICATED IN A 2009 REPORT AND FURTHER INDICATED IN 2010 AND 2011 UPDATES

The main points:
More Rigorous
Science
Foundations
Emphasis on the Scientific Method and Reasoning

Extending out to Social and Cognitive Sciences

HHMI

Scientific Foundations for Future Physicians


## AANMC: MARCM 298 2044 LEMTER



## Dear Colleagues,

The AAMC is in the third year of a multi-year review of the MCAT exam. At this juncture, the -member Fith MCAT Review (MR5) Committee has dratted preliminary reco 22-member Fifth MCAT Review (MR5) Committee has drafted preliminary recommendations for the future exam. The committee is scheduled to announce final recommendatio recommendations to the AAMC Board of Directors in February 2012.

The committee developed its recommendations based on input from blue-ribbon and advisory committees and groups, including the AAMC-HHMI Scientific Foundations for Future Physicians (SFFP) Committee, the AAMC Behavioral and Social Sciences Expert Panel, the Holistic Review Project Advisory Committee, and others. Committee members received over 2,700 completed surveys from baccalaureate and medical school faculty, administrators, residents, and medical students. Additionally, the MR 5 committee held more than 75 outreach events to solicit input, including seven at the 2010 AAMC Annual Meeting

The committee's preliminary recommendations preserve what works best about the current MCAT exam, eliminates what doesn't, and enriches the exam by giving attention to concepts successful. The following preliminary recommendations provide a basis for conversation as the committee prepares for its final recommendations. They are likely to recommend a new exam that:
. Includes four test sections and reports four scores

- Molecular, Cellular, and Organismal Properties of Living Systems
- Physical, Chemical, and Biochemical Properties of Living Systems
- Behavioral and Social Sciences Principles
- Critical Analysis and Reasoning Skills

2. Tests examinees' knowledge and use of the concepts in biology, chemistry, physics biochemistry, cellular/molecular biology, research methods, and statistics that medical schoo faculty, students, and residents rate as most important to entering students' success.
3. Tests examinees' knowledge and use of the concepts in behavioral and social sciences research methods, and statistics that provide a solid foundation for medical students' learning about the behavioral and socio-cultural determinants of health.
4. Tests examinees' ability to analyze and reason through passages in ethics and philosophy, cross-cultural studies, population health, and a wide range of social sciences and humanities discipines to ensure that students possess the necessary critical-thinking skills to be successful in medical school.

## ple section.

r to the current 1-15 scale, rather than a pass/fail or other on
inary recommendations publicly at the upcoming Nationa alth Professions (NAAHP) and Group on Student Affairs rious other AAMC spring meetings in April. Since those nembers, the AAMC also will issue a press release about the farch 31
s recommendations, including the resources that should AAMC should do to develop new measures of integrity, nal characteristics that admissions committees can use early Web site: www.aamc.org/mr5. This Thursday, new mmendations will be added to the site and the latest edition so will be sent outlining details.
es
of Medicine
mittee Vice Chair
ge of Medicine

## The new MCAT that will take effect in 2015:

The new directions for the MCAT exams will include four test sections and report four scores:

- Molecular, Cellular, and Organismal Properties of Living Systems
- Physical, Chemical, and Biochemical Properties of Living Systems
- Behavioral and Social Sciences Principles
- Critical Analysis and Reasoning Skills

The MCAT will test examinees' knowledge and use of the concepts in biology, chemistry, physics, biochemistry, cellular/molecular biology, research methods, and statistics that medical school faculty, students, and residents rate as most important to entering students' success.

> These points are directly and completely addressed in our new program. They clearly reaffirm the central importance of Biological Sciences in pre-medical education.

# OUR EKPERUENGE AND COMMWUTIMENT: 

WE HAVE BEEN DOING PRE-MEDICAL AND BIOMEDICAL EDUCATION FOR THE LAST 40 YEARS. AND EVIDENTLY, WE HAVE BEEN VERY SUCCESSFUL AT THAT.

WE ALREADY OFFER AN EXTENSIVE COLLECTION OF COURSES THAT ARE COMPLETELY ON TARGET WITH PRE-MEDICAL AND BIOMEDICAL EDUCATION. HERE IS A SELECTION OF COURSE TITLES IN BIOLOGY (NEXT SLIDE)

## Endocrinology

# Science of Vision <br> Human Anatomy 

Genetics Lab Anatomy and Biochemistry I Virology Physiology Lah Molecular Biology Immunology Stem Cell Biology Developmental Biology Medical Microhiolistology

Gross Human Anatomy Cell Biology of Cancer Physiology Human Anatomy Functional Genomics
Human Anatomy Lab Neurobiology

Human Physiology
Biochemistry II

# Biological Sciences <br> OAKLAND UNIVERSITY 



BEJNG GOMPETMTIVE!

# WE ARE NOT THE ONLY GAME IN TOWN, BUT ALREADY WE ARE BECOMING A VERY SUBSTANTIAL FORCE IN THE REGIONAL PRE-MED NICHE. 

WHERE DO WE WANT TO GO IN THE NEXT FIVE YEARS?

WE ARE AIMING TO HAVE THE BEST PREMEDICAL PROGRAM IN THE STATE OF MICHIGAN.

STRONG PUBLIC AWARNESS OF OU WITH THE LAUNCH OF OUR MEDICAL SCHOOL

THE CLOCK IS TICKING WITH THE COMING CHANGES IN THE MCAT EXAMS

WE ARE GOING TO BE THE FIRST IN THE REGION WITH A PROGRAM THIS GOOD

תUNUOR/SENUOR SURVEYロ

To determine the potential for our students' interest in the BMS program, we have just surveyed our 300- and 400level classes. We received 321 unique responses:

Students thinking we should offer the program: $\mathbf{8 9 \%}$
Students that would have been interested in such a program if it had existed when they entered OU:

Students who would recommend it to other students:

Students who believe the program would specifically attract new students to OU:

ADDRESSMNG SOME
BUDGET CONGERNS:

During the Senate review process there were concerns that pertained to the budget. We have always maintained that our budget is based on significant net revenue with regards to projected enrollments. We were fairly optimistic that these projections are realistic (see OIRA chart). However, because of the concerns, we have adjusted the budget to reflect a more modest enrollment projection and trimmed the requested resources accordingly.

## ADSUSTRD BUDGET:

| Original Budget 10/2010 |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| Headcount |  | 50 | 100 |  | 150 |  |
|  |  |  |  |  |  |  |
| Total Revenue |  | $\$ 475,031.25$ | $\$ 958,687.50$ | $\$ 1,450,968.75$ | $\$ 1,943,250.00$ | $\$ 1,943,250.00$ |
|  |  |  |  |  |  |  |
| Total Compensation |  | $\$ 143,260.50$ | $\$ 418,584.00$ | $\$ 698,781.00$ | $\$ 781,422.00$ | $\$ 781,422.00$ |
| Total Operating Expenses |  | $\$ 75,398.00$ | $\$ 432,620.00$ | $\$ 387,968.00$ | $\$ 423,451.00$ | $\$ 317,458.00$ |
| Total Expenses |  | $\$ 218,658.50$ | $\$ 851,204.00$ | $\$ 1,086,749.00$ | $\$ 1,204,873.00$ | $\$ 1,098,880.00$ |
|  |  |  |  |  |  |  |
| Net |  | $\$ 256,372.75$ | $\$ 107,483.50$ | $\$ 364,219.75$ | $\$ 738,377.00$ | $\$ 844,370.00$ |


| Revised Budget 4/2011 |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| Headcount |  | 25 |  | 50 |  | 75 |
|  |  |  |  |  | 100 |  |
| Total Revenue |  | $\$ 237,515.63$ | $\$ 479,343.75$ | $\$ 725,484.38$ | $\$ 971,625.00$ | $\$ 971,625.00$ |
|  |  |  |  |  |  |  |
| Total Compensation |  | $\$ 63,770.00$ | $\$ 178,366.00$ | $\$ 299,962.00$ | $\$ 323,162.00$ | $\$ 323,162.00$ |
| Total Operating Expenses |  | $\$ 66,750.00$ | $\$ 212,352.00$ | $\$ 160,566.00$ | $\$ 168,915.00$ | $\$ 170,922.00$ |
| Total Expenses |  | $\$ 130,520.00$ | $\$ 390,718.00$ | $\$ 460,528.00$ | $\$ 492,077.00$ | $\$ 494,084.00$ |
|  |  |  |  |  |  |  |
| Net |  | $\$ 106,995.63$ | $\$ 88,625.75$ | $\$ 264,956.38$ | $\$ 479,548.00$ | $\$ 477,541.00$ |

## ADDRESSING CHAIR OF CHEMISTRY CONCERNS:

AT THIS TIME ALL DIFFERENCES WITH ART BULL WITH REGARDS TO THE PROPOSAL HAVE BEEN RESOLVED. WE HAVE CLARIFIED OUR POSITION ABOUT THE BUDGET AND AGREED TO PROVIDE ACCESS TO THE NEW PROGRAM WITH SOME OF THE COURSES OFFERED BY THE CHEMISTRY DEPARTMENT

ART AUTHORIZED ME TO REPORT TO THE SENATE TODAY THAT HE IS IN FULL SUPPORT OF OUR PROPOSAL.
(2nd PART BY ANNE HITT)

## AAMC COMPETENCIES

Competency
Quantitative Reasoning
Scientific Inquiry
Basic Physical Processes
Basic Chemical Principles
Molecular Biochemistry
Molecular Cell Biology
Physiology and Immunology
Genetics and Evolution

Core Courses
MTH 154, 155 and STA 228
BIO 206, 308, 322,492, 493, 499, PSY 250
PHY 151, 152, 158
CHM 157, 158, 234,235, 237
BIO 111, 325, 473, BCM 453, BCM454
BIO 111, 307, 309
BIO 207, 322, 423
BIO 341, 445

| CURRICULUM |
| :--- | :--- |
| COURSES BIOLOGY |

# CURRICULUM - COGNATE 

 COURSESMTH 154-155
STA 228
PHY 151-152, 158

CHM 157-158
CHM 234-235, 237
PHL 103
PSY 100

Calculus I and II
Biological Statistics
Introductory Physics I, II and lab

General Chemistry I and I
Organic Chemistry I, II and Iab
Introduction to Ethics
Foundations of Contemporary Psychology

PSY 250

Introduction to Research Design

## ELECTIVE COURSES

| Medical Anthropology | Gross Human Anatomy | Neuroanatomy |
| :---: | :---: | :---: |
| Ecology | Advanced Human Physiology | Medical Parasitology and Mycology |
| Histology | Advanced Human Anatomy | Science of Vision |
| Histology lab | Cellular Biochemistry | Independent Research |
| Vertebrate Zoology | Endocrinology | Physiological Psychology |
| Physiology | Advanced Cell Topics | Social Cognition |
| Developmental Biology | Molecular Biology | Health Psychology |
| Developmental lab | Advanced Genetics | Abnormal Psychology |
| Biochemistry lab | Medical Microbiology | Psychopathology of Childhood |
| Genetics lab | Cell Biology of Cancer | Sociology of Mental Illness |
| Neurobiology | Virology | Sociology of Health and Medicine |
| Animal Behavior | Functional Genomics | Sociological Perspectives on Aging |

## HALLMARK OF BMS - INTEGRATIVE COURSES

Require a broad knowledge base Biological, Chemical, Physical, and Social Sciences

Identification and application of information from

Scientific literature, Bioinformatics Databases, etc.

SYNTHESIS
Critical thinking
TEAMWORK and COMMUNICATION
Required real world skills

## INTEGRATIVE COURSES - UNIQUE TO

## BMS

Scientific Inquiry Laboratory
Focused on a single medically relevant topic (Example diabetes)
Molecular $\rightarrow$ Biochemistry $\rightarrow$ Cell $\rightarrow$ Organs $\rightarrow$ Organism $\rightarrow$ Societal Impact
Integrative Pharmacology
Human Pharmacology
Clinical application
Physiological functions
Pharmacological principles
Biochemistry of actions
Integrative Biomedicine and Disease (capstone)
Student based investigation of multiple aspects of clinically relevant diseases

Molecular $\rightarrow$ Biochemistry $\rightarrow$ Cell $\rightarrow$ Organs $\rightarrow$ Organism $\rightarrow$ Societal Impact
$\rightarrow$ Ethics of Disease Management
Tools - Scientific and Popular Literature, Bioinformatics Databases,


## ACTIVE EARNING CLASSROOM FOR INTEGRATIVE COURSES

Modeled on University of Minnesota Active Learning Classrooms (http://www.classroom.umn.edu/projects/ALCOverview.html)
"Furniture and technology allow students to work in small groups

Creates a cooperative learning environment encourages students to collaboration with peers questioning and teaching one another

Allows instructors to coach students during activities by assisting them in answering their own questions

Allows students to present their results to the class for review by peers and instructors"

## ADMISSION CRITERIA

BIO 111 - 3.6
CHM 157-3.6
Minimum 3.0 GPA in core program courses

## AAMC 2010 APPLICANT REPORT

Table 18: MCAT and GPAs for Applicants and Matriculants to U.S. Medical Schools by Primary Undergraduate Major, 2010
 additional inquiries.


## Applicants - 52 \% Biological Sciences, ~80\% CAS Matriculants - ~ 52 \% Biological Sciences, ~82 \% CAS

## AAMC 2010 APPLICANT REPORT

Table 18: MCAT and GPAs for Applicants and Matriculants to U.S. Medical Schools by Primary Undergraduate Major, 2010

Average MCAT scores and GPAS for year 2010 applicants and matriculants to U.S. Medical Schools by primary undergraduate major are displayed below. Please e-mail us at facts @aamc.org if you need further assistance or have additional inquiries.

| Applicants, 2010 | MCAT VR |  | MCAT PS |  | MCATBS |  | Total MCAT |  | MCAT WS |  |  | GPA science |  | GPA non-science |  | GPA total |  | Total Anolicants |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Mean | SD* | Mean | SD | Mean | SD | Mean | SD | 25th\%ile | Median | 75th Sile | Mean | SD | Mean | SD | Mean | SD |  |
| Biological Sciences | 8.9 | 2.1 | 9.2 | 2.3 | 9.9 | 2.1 | 28.1 | 5.4 | M | P | Q | 3.44 | 0.42 | 3.67 | 0.29 | 3.53 | 0.35 | 22,327 |
| -Wmomities | 100 | 19 | 96 | 4 | 400 | 20 | 296 | 49 | - | a | $\square$ | $3 \times 4$ | 0.43 | 365 | 020 | 954 | 0.31 | 2,950 |
| Math and Statistics | 9.7 | 2.1 | 10.6 | 2.3 | 10.3 | 2.2 | 30.5 | 5.6 | M | P | Q | 3.50 | 0.40 | 3.62 | 0.33 | 3.54 | 0.35 | 386 |
| Other | 9.0 | 2.2 | 9.1 | 2.3 | 9.6 | 2.2 | 27.7 | 5.7 | M | P | Q | 3.43 | 0.44 | 3.66 | 0.30 | 3.53 | 0.34 | 7,229 |
| Physical Sciences | 9.3 | 2.1 | 10.4 | 2.3 | 10.1 | 2.1 | 29.8 | 5.5 | M | P | Q | 3.48 | 0.42 | 3.61 | 0.33 | 3.53 | 0.35 | 4,672 |
| Secial Scieases | 05 | 20 | 03 | 23 | 07 | 21 | 208 | 5.2 | M | 0 | 0 | 22 | 0.46 | 25 | 2 | 4 | 24 | 007 |
| Specialized Health Sciences | 8.4 | 2.3 | 8.4 | 2.3 | 8.9 | 2.3 | 25.7 | 6.0 | M | 0 | Q | 3.40 | 0.44 | 3.63 | 0.31 | 3.51 | 0.34 | 1,181 |

* SD = standard deviation

| WA-trioulartor 3010 | MCAT VR |  | MCAT PS |  | MCAT BS |  | Total MCAT |  | MCAT WS |  |  | GPA science |  | GPA non-science |  | GPA total |  | $\begin{array}{\|c\|} \text { Total } \\ \hline \text { Matriculants } \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (r) | Mean | SD* | Mean | SD | Mean | SD | Mean | SD | 25th*ile | Median | 75th \%ile | Mean | SD | Mean | SD | Mean | SD |  |
| Biolozical Sciences | 9.8 | 1.7 | 10.3 | 1.9 | 10.8 | 1.6 | 30.8 | 4.1 | N | P | 0 | 3.63 | 0.31 | 3.77 | 0.23 | 3.69 | 0.26 | 9.559 |
| Humanities | 10.6 | 1.5 | 10.5 | 1.8 | 10.9 | 1.6 | 32.0 | 3.6 | $\bigcirc$ | Q | R | 3.58 | 0.33 | 3.74 | 0.23 | 3.66 | 0.24 | 991 |
| Math and Statistics | 10.3 | 1.6 | 11.3 | 1.8 | 11.2 | 1.6 | 32.8 | 3.9 | N | Q | R | 3.63 | 0.30 | 3.72 | 0.25 | 3.66 | 0.26 | 183 |
| Other | 9.9 | 1.7 | 10.2 | 2.0 | 10.6 | 1.7 | 30.7 | 4.2 | N | Q | Q | 3.60 | 0.33 | 3.75 | 0.23 | 3.67 | 0.25 | 3,057 |
| Physical Sciences | 10.0 | 1.7 | 11.3 | 1.9 | 11.0 | 1.7 | 32.2 | 4.1 | N | Q | Q | 3.65 | 0.31 | 3.71 | 0.26 | 3.67 | 0.26 | 2,201 |
| Soelalselemees | 10.2 | 15 | 40.4 | 4. | 40.6 | 15 | 31.2 | \% |  | - |  | 3.56 | -0.3) | 369 | -0.26 | 369 | -2.26 | 2,260 |
| Specialized Health Sciences | 9.5 | 1.6 | 9.8 | 1.9 | 10.3 | 1.6 | 29.5 | 4.0 | N | $p$ | Q | 3.60 | 0.34 | 3.74 | 0.24 | 3.67 | 0.26 | 406 |
| Allmatriculants | 9.9 | 1.7 | 10.4 | 1.9 | 10.8 | 1.1 | 31.1 | 4.1 | N | Q | R | 3.61 | 0.32 | 3.15 | 0.24 | 3.67 | 0.26 | 18,665 |

## Applicants - 2.7 \% Health Sciences Matriculants - 2.1 \% Health Sciences

