Please read instructions carefully before you complete this form. Please print clearly or type.

**JANGIR** 

Submitted: 12-13-2007, 11:18:59

# MIT Application for Graduate Admission 2008

X September Department Health Sciences and Technology Medical Engineering / Medical Physics Area of research or interdisciplinary program consult department listings in Book I Initial degree objective at MIT Ph.D. Final degree objective (if different) Ph.D.  $\mathbf{X}$  No If yes, indicate departments \_ Full legal name  $\frac{}{}$  last/family/surname 6 Date of birth -Former name (if any) -Female Male X Native American Tribal affiliation Ethnicity (optional): X Caucasian/White Other Please describe US citizens □ Afro-Caribbean Chicano or Mexican-American and permanent African parentage ☐ Puerto Rican residents only U Other Hispanic Reply address state or province zip or postal code Permanent address state or province country zip or postal code Daytime phone Evening phone country code area code/city code number country code area code/city code Fax number \_\_\_\_\_\_ Email address. area code/city code Citizen of \_\_\_\_\_ US Social Security # (if any)\_ City, state and country of birth\_ If a foreign citizen in the US, give date of entry  $\frac{}{month}$ \_\_\_\_\_ I-20 ID Number \_ If an Exchange Visitor (J), give program number and name of sponsor Permanent resident of \_ If a permanent resident (immigrant) of the US, give alien registration number . Have you previously applied for admission to MIT? 

Yes No MIT ID 

if assigned one as a former student If yes, what status? Freshman Transfer Special Graduate Date: \_ List all colleges and universities attended, major field, dates of attendance and name of degrees received or expected (list most recent first): NORTHWESTERN UNIVERSITY Unknown, Other / Applied 09-2004 06-2008 BS / SB EVANSTON, IL MathfieBiomedical Engineering Dates attended College/University Date degree awarded/expected CAPE TOWN. Biomedical Engineering / 03-2007 06-2007 UNIV OF CAPE TOWN \Study Abroad Actual name of degree/diploma South Africa College/University Location Major field Dates attended Actual name of degree/diploma Date degree awarded/expected Other graduate schools to which you are applying For department use: Admitted O Cond. Admitted O Not approved O Cond. Admitted Admitted Term -Not approved

Μľ	AIT Application for Graduate Admission (continued from front)	
17	7 Entrance tests: GRE: Date taken or to be taken: 12-2007 Scores: verbal 480	quantitative 800 analytic ?
	GRE Subject: Date taken or to be taken:Scores:	Subject:
	GMAT: Date taken or to be taken: Score	s:
	TOEFL: Date taken or to be taken:Score	s:
18	8 List language of instruction in: primary school; Russian	; secondary school English
	university English ; graduate school	Native language if other than English: Russian
19	9 Names of three persons to whom you have given evaluation forms. (Request those person	s to return the completed forms to you in time to meet the appropriate deadline.)
	Prof Mary Silber	Northwestern Univ.
	name title	institution/company
	Prof. Malcolm MacIver	Northwestern Univ.
	Prof. Matthew Glucksberg	Northwestern Univ.
	name title	institution/company
20	Please give the names, years of graduation, department affiliation, and relationships	of any close relatives who have attended MIT:
21	coauthoring a research paper that is in progress of being finalize	d
	Optimal movement in the prey capture behavior of weakly electr	ic fish]
22	2 Your extracurricular activities and accomplishments:	
	Ultimate Frisbee Team	
	• • • • • • • • • • • • • • • • • • • •	
23		re name of employer, dates, and nature of work:
	Research assistant for Sielc Inc.	
24	4 Other experience, including military, volunteer work, travel. Give dates and nature of	work:
	Studied abroad in South Africa with Global Health Technologies	program
	Stadiou asioad in Sodairy linea wan Global Floatair Footinologist	program.
nter	ternational students (non-immigrant visa holders) please complete the following:	
	<b>25</b> Your marital status: Single Married Number of children	
	If single, do you intend to marry before you come here? $\square$ Yes $\square$ No Wil	I your spouse come with you? L. Yes L. No
		10 10 0007
26	6 Signature:	

### Record of Courses Taken in Preparation for Graduate Study

Please carefully read the instructions below before you complete this form.

Based on your transcript(s), please complete the following summary of your college and university classes.

#### General instructions:

- Important: some departments do not require this form; other
  departments require only some of the fields to be completed—check
  the requirements for the department to which you are applying before
  completing this form. See pages 4–16 of this booklet.
- This form is not required for courses taken at MIT (except for the Department of Physics).
- If the department to which you are applying requires this form, a transcript will not be accepted as a substitute for this information.
- If your university system does not fit with the categories below—for example, if your courses do not have numbers or you did not receive course grades—leave those fields blank.
- Do not try to convert your university grading scale or GPA to MIT's scale. Indicate the grades/GPA as granted by your school and give us a brief explanation of your school's grading system.
- If the space provided is not sufficient, you may attach additional sheets.

#### Why we ask you to complete this form:

- We see transcripts from thousands of schools from all over the world.
   It is extremely helpful for us to review applicants' coursework and grades in a standard format.
- Transcripts show courses by semester or year. However, the best way
  for us to evaluate your preparation is to see your courses grouped by
  subject area, with the most relevant courses at the top.
- Transcripts do not list textbooks used; many departments find that information especially helpful.

#### **Grading System:**

Please describe the grading system(s) used at all colleges and universities
you have attended. Explain the specific meaning of any numeric values,
letter grades, and rankings.

Cumulative GPA as listed on transcript (if available)\_

Please list ou are ap		YOU ARE APPLYING seen that are most relevant to the graduate program to which le, group all math courses together and group all science courses	Year in which course was taken	Official course grade (if applicable)
Course no (if applicat		Principal textbook used (author and title)	Year ir was ta	Officia (if app
252-1	Honors Calculus	H.P.Greenspan Calculus: An Introduction to Applied Mathematics	04/05	4.0
251-2	Honors Calculus [Vector Calc]	H.P.Greenspan Calculus: An Introduction to Applied Mathematics	04/05	4.0
206-4	Honors Engineering Analyssis IV [Diff. Eqns]		04/05	4.0
311-1	Methods in Applied Math	W.E. Olmstead: Differential Equaitons in Applied Mathematics	05/06	4.0
311-2	Methods in Applied Math	[Optimal moveW.E. Olmstead: Differential Equaitons in Apment in the prey capture behavior of	05/06	4.0
311-3	Methods in Applied Math	J.W.Brown: Complex Variables and Applications	05/06	3.7
421-1	Models in Applied Math		06/07	4.0
346-0	Modeling and Computation		06/07	4.0
495-0	Topics Applied Math [Modeling neurosignals]		06/07	4.0
202-0	Probability	J.L.Devore: Probability and Statistics for Engineering and the Sciences	07/08	
303-0	Statistics	J.L.Devore: Probability and Statistics for Engineering and the Sciences	07/08	
334-0	Linear Algebra		07/08	
322-0	Modeling in Applied Math [Chaos theory]		07/08	
	SCIENCES			

Please list humanitie Course no.	s, social sciences, etc.). You may also use this sec	taken. Group courses by subject area (science, math, engineering, ction for any courses that you could not fit in the section above.	Year in which course was-taken	Official course grade (if applicable)
(if applicable	e) Course name	Principal textbook used (author and title)	> >	0 :=
210-1	Organic Chemistry	Wade: Organic Chemistry	04/05	3.3
210-2	Organic Chemistry	Wade: Organic Chemistry	04/05	3.3
210-3	Organic Chemistry	Wade: Organic Chemistry	04/05	2.3
210-1	Genetics/Evolution Biology	Purves: Life: Science of Biology; Griffiths: Intro. to Genetic Analysis	05/06	3
210-2	Biochemistry/Molecular Biology	Lodish: Molecular Cell Biology; Principles of Biochemistry	05/06	3.3
210-3	Cell Biology/Physiology	Alberts: Essential Cell Biology; Silverthorn: Human Physiology	05/06	3.3
135-3	General Physics	Halliday: Fundamentals of Physics	04/05	4.0
	GENERAL ENGINEERING			
206-1	Honors Engineering Analysis [MATLAB programming]/ Linear	Lay: Linear Algebra	04/05	4.0
206-2	Honors Engineering Analysis [Mechanics]		04/05	4.0
206-3	Honors Engineering Analysis		04/05	4.0
202-0	Intoduction to Electrical Engineering		05/06	4.0
201-0	Introduction to Material Sciences	Callister: Materials Science and Engineering: An Introduction	05/06	4.0
106-1	Engineering Design/Communication 1 [Design course]		04/05	4.0
106-2	Engineering Design?Communication 2 [Design course]		04/05	3.3
	BIOMEDICAL ENGINEERING			
301-0	Systems Physiology [Neuro]	Purves: Neuroscience	06/07	3.7
302-0	Systems Physiology [Cardio]	Lilly: Pathophysiology of Heart Disease	05/06	3.0
270-0	Intro to Fluid Mechanics	B.R.Munson: Fundamental of Fluid Mechanics	05/06	4.0
271-0	Intro to Biomechanics	Ozkaya: Fundamentals of Biomechanics	06/07	3.7
250-0	Biothermodynamics		06/07	4.0
371-0	Mechanics of Biological Tissue		06/07	4.0
390-0	Biomedical Engineering Design		06/07	
308-0 390-0	Biomedical Engineering Lab	D.C.Karnopp: System Dynamics: Modeling and Simulation of Mechatronic Systems	07/08 07/08	
344-0	Introduction to Dynamic Systems Biological Performance of Materials	2.5. M. Topp. System Systems. Modeling and Chindration of Meditationic Systems	07/08	
365-0	Artificial Replacement of Limbs		07/08	
346-0 366-0	Tissue Engineering Biomechanics of Movement		07/08 07/08	

#### THE NAME OF THE UNIVERSITY IS PRINTED IN WHITE ACROSS THE FACE OF THE ENTIRE TRANSCRIPT

Northwestern University 633 Clark Street Evanston, IL 60208 United States

OFFICIAL TRANSCRIPT

Confidential

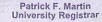
Page 1

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HEM	102-0	Gen Inorg Chem	1.00	1.00 T		Course		Description	Atten		rned Grade	Points
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ISTORY	2US	US History Credit	1.00	1.00 T		GEN_ENG	206-4		ering Analysis IV	1.00	1.00 A	4.00
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ATH	214-2	Integral Calc		1.00 T		PHYSICS	135-3	General Physi	.cs	1.00	1.00 A	4.00
HYSICS	135-1	General Physics	1.00	1.00 T			TERM GPA			5.00	5.00	17.60
HYSICS	135-2	General Physics	1.00	1.00 T			CUM GPA	: 3.708	CUM TOTALS :	13.00	24.00	48.20
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MD_ENG EN CRED Course rogram lan ourse HEM HEM EN CNN EN EN ENG	390-0 1XX Trans GPA  : School : Biomedi : School : Undecla  209-1 210-1 252-1 102-0 206-1 TERM GPA CUM GPA  : School : Biomedi : School : Undecla	Biom Engg Design Gen Credit 1XX  .: 0.000 Transfer Totals  Beginning of Undergr 2004 Fall (2004-09-22  of Engineering cal Engineering Major of Engineering Major of Engineering Pescription Advanced Conceptual Worksh Organic Chem Honors Calc/Engg Public Speaking Hon. Eng. Analysis : 3.825 TERM TOTALS : 3.825 CUM TOTALS  2005 Winter (2005-01-0 of Engineering cal Engineering cal Engineering red Major Description Organic Chem Writ Spec Contxt	Attempted Ear  1.00	1.00 T 4.00 1.00 S 1.00 B 1.00 A 1.00 A 4.00 15.00	Points  Points  Points  Points  Points  2.000	Plan Program Plan Course BIOL SCI BMD_ENG ECE ES_APPM  Program Plan Program Plan Course BIOL SCI BMD_ENG ES_APPM  MAT_SCI	CUM GPA  : School : Biomedi : School 210-2 302-0 202-0 311-2 TERM GPA CUM GPA  : School : Biomedi : School : Applied  210-3 270-0 311-3 201-0 TERM GPA CUM GPA	2006 Winter color Engineering cal Engineering cal Engineering of Engineering Mathematics Ma Description Biochem/Mol E Sys Physiolog Intro to EE Meth Appld Ma : 3.575 : 3.690  2006 Sprim of Engineering cal Engineering of Engineering of Engineering of Engineering Mathematics Ma Description Cell Bio/Phys Int Bme Flu M Meth Appld Ma Materls Propt : 3.750 : 3.700	CUM TOTALS : or (2006-01-03 to g Major  Lijor Attem  Sio BY  Atth TERM TOTALS : CUM TOTALS : ag (2006-03-27 to g Major  Lijor Attem  Siol Gech Ech Ech Ech Ech Ech Ech Ech Ech Ech E	17.00 2006-03-:  pted Ea: 1.00 1.00 4.00 21.00 2006-06-:  pted Ea: 1.00 1.00 4.00 2.00 2.00	28.00  17)  rned Grade  1.00 B+ 1.00 A 1.00 A 4.00 32.00  09)  rned Grade  1.00 B+ 1.00 A 1.00 A 4.00 36.00	Points 3.300 4.000 4.000 777.500

NORTHWESTERN UNIVERSITY • Office of the Registrar

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United States

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Student ID:

ORTHWESTERN UNIVERSITY · NORTHWESTERN UNIVER

BMD\_ENG BMD\_ENG ENGLISH Program Plan : Biomedical Engineering Major : School of Engineering 271-0 301-0 270-2 Applied Mathematics Major Intro to Biomechanics Systems Physic American Lit Trad 1.00 1.00 1.00 4.00 29.00 d Grade 1.00 A-1.00 A-1.00 B+ 1.00 A 3.700 3.700 3.300 4.000

421-1 TERM GPA CUM GPA School of Engineering 2007 Winter (2007-01-03 to 2007-03-16)

ES\_APPM

Models Appl Math 3.675 T

3.697

TERM TOTALS :

14.700

Program Plan Program Plan School of Engineering Applied Mathematics Major Biomedical Engineering Major

BMD\_ENG BMD\_ENG ES\_APPM ES\_APPM 495-0 190-0 250-0 371-0 346-0 Topics Appl Math
TERM TOTALS:
4.000 TERM TOTALS:
3.736 CUM TOTALS: Description Biothermodynamics Mech Biol Tissue Modeling/Computation Intro to Xhosa Attempted Earned Grade
0.33 0.33 A
1.00 1.00 A
1.00 1.00 A 1.00 1.00 1.00 1.00 4.33 33.33

2007 Spring (2007-03-26 to 2007-06-08) TERM GPA CUM GPA

.00 A

4.000 4.000 17.320 124.520

Points

Confidentia

Program Plan Program : Applied School of Engineering Major Biomedical Engineering Major School of Engineering Mathematics Major

UNIVERSITY OF CAPE TOWN TERM GPA : CUM GPA : 354-0 St Abrd Affiliated 3.736 TERM TOTALS : Attempted 33.33 Earned Grade 48.33 Points 0.000

: School of Engineering
: Biomedical Engineering Major 2007 Fall (2007-09-25 to 2007-12-14)

Program 308-0 202-0 3 390-0 : Applied School of Engineering Applied Mathematics Major Biomed Engg Lab Probability Attempted 1.00 1.00 0.00 33.33

Earned Grade

Points

MECH\_ENG

CUM GPA :

TERM GPA

Intro Dyn Syst 0.000 7 3.736 7

TERM TOTALS

0.00

0.000

Undergraduate Career Totals
CUM GPA: 3.7 3.736 COM TOTALS :

33.33

48.33

124.520

Foreign Language Proficiency: Two year proficiency in Russian established by examination

Non-Course Milestones

EXPLANATORY LEGEND PRINTED ON BACK BROWN STAINS INDICATE UNAUTHORIZED ALTERATIONS NORTHWESTERN UNIVERSITY • Office of the Registrar

A LIGHT SOURCE

Patrick F. Martin University Registrar

#### NORTHWESTERN UNIVERSITY

Evanston - Chicago, Illinois **EXPLANATORY NOTES** 

**EVANSTON CAMPUS** 

The Office of the Registrar, Evanston, Illinois issues transcripts of records for the

Arts and Sciences Dental Music Education and Social Policy

Engineering & Applied Science The Graduate School

#### CHICAGO CAMPUS

The offices of the Schools listed below are located at 303-357 East Chicago Avenue, Chicago, Illinois. The Office of the Dean of the School concerned issues

Law School of Continuing Studies (Evening Divisions)

Grades for work transferred from another institution are not recorded. If such grades are needed, the student must request a transcript directly from the

#### EXPLANATION OF GRADES AND GRADE POINTS

Grade Points			tember 1982 - Grade			ate oints	Grade
4	=	A	Excellent	2.3	=	C+	
3.7	=	A-		2	=	C	Satisfactory
3.3	=	B+		1.7	=	C-	
3	=	В	Good	1	=	D	Poor but passing
27		R-				F	Fail

Grade Points			Grade
4	=	A	Excellent
3	=	В	Good
2	= :	C	Satisfactory
1		D	Poor but Passing (not used for students in the Gradual School)
0	=	F	Fail (or dropped without permission)

Gra		oints	Grade		ade P	oints	Grade
7	=	A	Superior	1	=	D	Poor, barely passing
6	==	A-			= 1	E	Condition, removable by
5	=	В	Good				a "second examination"
4	=	B-					to a grade not higher
3	=	C	Fair				than D (discontinued
2		C-					September
							1945)
				0	=	F	Failure, no credit

1	Pre	viou	s to Ju	ne 1927				
	Gra	ide F	Points	Grade	Grade Points			Grade
	3	=	A	Superior	0	=	E	Condition, removable by
	2	=	В	Good				"second examination"
	1	=	C	Fair	0	=	F	Failure, no credit
	-1	=	D	Poor				

TO TEST FOR AUTHENTICITY: Translucent globe icons MUST be visible from purple SCRIP-SAFE® paper with the name of the institution appearing in white type

NORTHWESTERN UNIVERSITY . NORTHWESTERN UNIVERSITY .

ADDITIONAL TESTS: When photocopied, a latent security statement containing the words COPY COPY appear over the face of the entire document. When this paper is touched by fresh liquid bleach, an authentic document will stain. A black and white or color copy of this document is not an original and should not be accepted as an official institutional document. This is in accordance with the Family Educational Rights and Privacy Act of 1974. If you have any questions about this document, please contact our office at (847) 491-5234. ALTERATION OF THIS DOCUMENT MAY BE A CRIMINAL OFFENSE!

THIS DOCUMENT CANNOT BE RELEASED TO A THIRD PARTY WITHOUT THE WRITTEN CONSENT OF THE STUDENT.

#### TRANSCRIPT NOTATIONS AND ABBREVIATIONS

Indicates work in progress°

LP No grade, no credit®

Pass with credit"

For Doctoral students only

Satisfactory (non-credit course)

Full academic credit for Spring Quarter 1969-70. After 1970, transfer grade

Unsatisfactory (non-credit course)

Incomplete - Additional work required°°

Dropped without permission - counts as "F" (discontinued September 1962).

Neither K, T, P, or N is included in either the quarterly or the cumulative

Previous to September 1962, a provisional grade was requested in cases of incomplete and/or absent from final examination. In such cases the provisional grade was used in computing the quarterly average. If no provisional grade was reported, grade "C" was used in computing the quarterly average. Both the quarterly and cumulative average, as well as hours and grade points were changed as soon as a final grade was reported.

Absent from examination; grade subject to make-up examination

Course dropped with permission, no penalty if work to date of dropping was

D.W.P. Dropped with permission; F grade

Beginning September 1969 - on a course system - "1" denotes one course. For the purpose of transfer credit, one course during the academic year should be considered to be the equivalent of four quarter hours or 2 2/3 semester

The Summer Session combines the course offerings of the School of Continuing Studies (semester system) and the Evanston Campus (quarter system). For purposes of transfer credit, courses taken during the Summer Session should be considered to be the equivalent of four quarter hours or three semester hours. Beginning Fall 2005, the School of Continuing Studies converted to the quarter system calendar. Therefore, courses taken during the summer session 2006 and forward should be considered to be the equivalent

A quarter hour (or a semester hour) was the work done in a fifty-minute lecture or recitation once a week for a quarter (or a semester), or a laboratory for a minimum of two hours a week for a quarter (or a semester); 2 semester hours

III. Previous to September 1942 - on semester system (exception - year 1918 - 19 on term system same as a quarter system).

A minimum of 180 quarter hours (or 120 semester hours) was required for

#### STATUS OF UNDERGRADUATES

In good standing. This indicates student is entitled to honorable dismissal in every sense of the word and may continue his course in Northwestern University at any time. No separate letter of honorable dismissal is issued by this institution.

Academic Dismissal. A student, whether on probation or not, may be dismissed for academic deficiency whenever the faculty committee decides that such action is indicated by a record of poor scholarship. A student may be re-admitted at the discretion of the faculty committee.

#### COURSE NUMBERING SYSTEM

100 level Courses primarily for freshmen and sophomores usually without college

200 level Courses primarily for sophomores and juniors usually with the prerequisite of a 100 level course in the same or a related department.

300 level Courses primarily for upperclassmen and graduates, often with the prerequisites of a 100 and/or 200 level course in the same or a related

400 level Courses or seminars primarily for graduates, in which the major part of

Courses for graduates only; seminars in which the work is primarily

DEGREES AWARDED

School of Management

Master of Business Administration

Master of Management: Effective September 2000, by official University action, recognized as Master of Business Administration.

Master of Manufacturing Management (Joint Program with the School of Engineering) Bachelor of Business Administration (Chicago Campus - discontinued June 1972)

Bachelor of Science In Business Administration (Evanston Campus - discontinued June

College of Arts and Sciences

Bachelor of Arts

Bachelor of Arts (classical language required, 1859-1948)

Bachelor of Arts Honors Degree (1934-1948)

Bachelor of Arts, Special Program in "The Liberal Arts," classical language no longer required

Bachelor of Science (1876-1954)

Bachelor of Science Honors Degree (1934-1948)

School of Education and Social Policy

Master of Science in Education and Social Policy (Formerly Master of Science in Education) Master of Science in Learning and Organizational Change

Bachelor of Science in Education and Social Policy (Formerly Bachelor of Science in

School of Journalism

Bachelor of Science in Journalism Master of Science in Advertising School of Music

Bachelor of Music

Bachelor of Music Education (discontinued 1985)

Certificate in Performance

School of Communication (formerly School of Speech)

Master of Science in Communication (1986 - present)

School of Engineering and Applied Science

Master of Engineering Management

Master of Information Technology: Effective December 2005, by official University action,

Master of Project Management: Effective December 2005, by official University action,

Master of Science in Project Management

Master of Urban and Regional Planning

Bachelor of Science in Applied Mathematics

Bachelor of Science in Biomedical Engineering

Bachelor of Science in Civil Engineering

Bachelor of Science in Electrical Engineering

Bachelor of Science in Manufacturing and Design Engineering

Graduate School

School of Medicine - Department of Physical Therapy

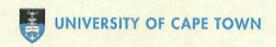
Master of Physical Therapy

University Senate

Senate - Bachelor of Science - Senate

A degree awarded June 1944 - June 1949, on recommendation of the University Senate, to men registered in any one of the undergraduate schools of the University who completed the required 180 quarter hours, but who were unable to meet all specific degree requirements because their college course had been interrupted by World War II.





Sizanani

Collaboration in Biomedical Engineering and Healthcare Technology Management incorporated in the

"Global Healthcare Technologies" Engineering Program

Spring Quarter 2007 (March 28<sup>th</sup> – June 8<sup>th</sup>)

### STUDENT TRANSCRIPT

Confidential

Course Title	Credits	Contact Hours	Grade
Healthcare in Resource-Poor Environments	1.5	45	A-
Healthcare Technology Assessment and Planning	1	30	В+
Healthcare Technology Innovation and Design	1	30	A-
Race, Culture and Identity in South Africa	0.5	15	Α-

Prof. Sue Kidson PhD

Head: Department of Human Biology UCT

Mladen Poluta

Director: HTM Programme UCT

Issued: July 5th 2007

DOC

# Statement of Objectives

Please read instructions carefully before you complete this form.

Please give your reasons for wishing to do graduate work in the field you have chosen. Prepare your statement of objectives and goals in whatever form clearly presents your views. Include as far as you can, your particular interests, be they experimental, theoretical, or issue-oriented, and show how your background and MIT's programs support these interests. The statement could be much like a proposal for graduate studies, in the more specific context of your professional objectives. You should set forth the issues and problems you wish to address. Explain your longer-term professional goals. The Admissions Committee will welcome any factors you wish to bring to its attention concerning your academic and work experience to date.

- Type or print using black ink.
- •Use reverse side if necessary or separate form.
- Keep a copy for your file. You may also wish to provide copies to your evaluators before they complete their forms.
- Return this form with the completed application to the appropriate MIT department (see pages 4–16).

Health is an aspect of life that cannot be ignored by anyone; people have to deal with a variety of health problems, and medicine is the science that allows us to remedy many of them. As such, if one wants to make a significant difference in the lives of others while getting fulfillment from the work that this entails, the field of improved medical healthcare delivery is an ideal choice. For many this means medical school, public health, or the administrative aspects of the field, but I have always enjoyed the analytical side of medicine. In my undergraduate study of applied mathematics and engineering I have been exposed to less obvious facets of medicine, and with the decision to focus on biomedical engineering I have been able the combine my own analytical interests with the general study of medicine. With the aim to expand on my specific research interests, I think the MIT and Harvard medical engineering and medical physics program would be a great fit for me.

The fact that I enjoyed math and science [and I seemed somewhat good at them] led me to begin studying engineering. Later, I realized that I was actually drawn to the mode of thinking and analysis required for an engineer, such as the logical yet creative approaches to problem solving that call upon all of one's resources and simultaneously leave frustration and desire for more. My first realization of this came in an applied math course at Northwestern University in which the professor asked how many of his students intended to major in applied mathematics; when no one replied, he said that he would try to convert at least a few of us. As it turns out, I was one of the students he managed to convert, and I have been appreciative of that ever since. Applied mathematics has given me the basics that all fields of engineering rely upon and allowed me to recognize the intricacies of various engineering techniques. My specific interest in the connection between applied math and engineering lies in the modeling of real systems with mathematical models to analyze and answer questions pertaining to those systems. I explore this in my current research into fish behavior, and I would like to pursue it further in research focusing on human physiological systems.

The decision to enter the biomedical field of engineering was not a surprising one for me, but it involved a few bumps along the way. Medicine is a career that my family has encouraged me to pursue all my life, but having been surrounded by medical discussions growing up, I have often wondered if my enthusiasm for the subject was independent of my family's work and interest. But before long at university I realized that most of my academically related conversations with peers naturally focused on healthcare delivery. Several classes on subtopics in the field struck me as uninteresting at first glance but gradually became more engaging as we explored their applications to medicine. My study abroad trip to South Africa was the turning point that led me towards research in biomedical engineering: there, the clinic and hospital visits showed me not only the progress biomedical engineering has made in healthcare delivery, but also ways in which it can still improve the lives of people around the world. It is on this goal that I would like to focus my work.

I believe that my previous and current research experiences have helped develop in me the qualities that will serve me well in the future. My determination [or perhaps stubbornness] keeps me exploring new approaches to a problem until all options are exhausted. I also tend to set high goals for myself, and although I am occasionally frustrated with no recourse at hand, I generally find this to be a rewarding quality. Organization is another attribute that I do not undervalue; the demands of engineering classes are substantial, but due to my time management skills, I have [almost] never had to stay up all night to finish an assignment or prepare for an exam. Over the past few years, I have come to know through personal reflection my strengths and weaknesses [for instance I am not very good at statistics], and I do not hesitate to speak to my professors and TAs about my projects.

My biomedical engineering concentration at Northwestern University is biomechanics, and I have been exposed to a number of other areas of research through my modeling courses. In addition to modeling mechanical systems, I have done work on models of electrical signal transduction in neurons, and although this has not been my focus, I find it very exciting. Looking forward, I am hoping to continue in the field of biomedical engineering and concentrate on research that would

12-13-2007

Signature Date

### Statement of Objectives (Cont.)

coincide with my interest in human physiological modeling. I believe that the MEMP program would be a great place for me to refine my interest in the fields of engineering and medicine. I am hoping the range of research opportunities within the two universities will allow me to explore many facets of engineering in the medical field; I would not have to limit myself in the course of research and be able to draw from work being done within many different areas and specializations. Further, I think the program's coursework layout will effectively complement the courses I intend to take in the last two quarters at my current institution. Direct patient care with pre-clinical coursework will add a very engaging perspective to my understanding of biomedical engineering, while the engineering courses will continue strengthening my physical science background.

My main goal in the near future is to challenge myself in the field where I can have the most impact and help the greatest number of people. Through the events and my studies of the past four years I have determined that biomedical engineering is the field that will allow me to do this. Undertaking graduate level work at the MIT and Harvard medical engineering and medical physics program will be an excellent step for my growth as a researcher and as an individual. While I do not expect this pursuit to be easy, with my educational background and my personal qualities, I believe I will be able to perform well in the graduate level courses and make significant contributions to the lab in which I find myself.

## MIT Evaluation for Graduate Admission

Return to: Please read instructions carefully before you complete this form. Department of Massachusetts Institute of Technology 77 Massachusetts Avenue, Room \_ Part 1 To be completed by all applicants Cambridge, MA 02139-4307 Please type or print using black ink. Important: In the upper right of this form, fill in the return address department name and room number (as indicated on pages 4-16 of this booklet). Name: Confidential Applying for admission in the department of Health Sciences and Technology area of research MEMP for the ultimate degree of Ph.D. Confidential for the term beginning in September 2008 Under the Family Educational Rights and Privacy Act of 1974, a student enrolled at MIT has access to his or her education records. We intend to comply with both the letter and the spirit of this law, while still allowing the student the option of waiving the right to access. If you wish to waive the right to examine this evaluation at a later date, please sign here. Confidential Applicant's signature: Part 2 To be completed by evaluator An application for admission to MIT requires evaluations from three teachers or people capable of judging the professional and academic promise of the applicant. A separate letter of evaluation may be attached to this form if necessary. Please return in time for her/him to meet the following deadlines: January 15 for June or September admissions for applicants except as follows: December 15 for Aeronautics and Astronautics, Architecture, Biology, Brain and Cognitive Science, Chemistry, Electrical Engineering and Computer Science, Health Sciences and Technology, Leaders for Manufacturing (see http://lfm.mit.edu for additional details), Mechanical Engineering, Media Arts and Sciences; December 15 for Operations Research; December 31 for Biological/Engineering and Political Science; January 1 for Physics and Science, Technology and Society; January 2 for Chemical Engineering, Civil and Environmental Engineering, Economics, Linguistics and Philosophy, Mathematics; January 3 for Urban Studies and Planning; January 5 for Earth, Atmospheric and Planetary Sciences; January 7 for Nuclear Science and Engineering; January 10 for Computation for Design and Optimization, Engineering Systems Division and Technology and Policy Program; and February 15 for Center for Real Estate. November 1 is the deadline for the February term. January 12 and April 6 are the deadlines for Round 1 and Round 2, respectively, for the Master of Engineering in Logistics (MLOG) Program. For the Evaluation Form, please go to http://www.mit.edu/mlog/. For the Systems Design and Management Evaluation Form, please go to http://sdm.mit.edu. Evaluator's name: Mary Silber Title Professor Dept. of Engineering Sciences & Applied Math. USA Evanston IL 60208 email m-silber@northwestern.edu Date\_11-30-2007 School or company Northwestern University \_\_\_\_\_Telephone number\_8474918782 In what capacity do you know the applicant? advisor, student in course, research assistant How long have you known the applicant? 2.5 years How does this applicant compare with his or her peer group in academic ability? Truly exceptional X Outstanding ☐ Well above average ☐ Above average Average Below average Inadequate opportunity equivalent to the very best comparable to the demonstrated high able to complete lower 50% to observe you have known - a person best student in a work to the Ph.D. who, in your experience, current class appears only every few years In your opinion, how would this student compare to other students in the graduate program at MIT?

(continue on reverse side)

■ Well above average ■ Above average ■ Average

Please give the applicant's relative standing in your department (e.g., 7th in 89) 1st in small class in applied math.

X Outstanding

Truly exceptional

☐ Below average ☐ Inadequate opportunity

to observe

valuable. If you have any reason to believe that the applicant should not be cor	
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Personal evaluation of the applicant. What particularly qualifies this student for study at MIT? Information about accomplishments in research or inde-

#### **McCormick**

Robert R. McCormick School of Engineering and Applied Science Northwestern University Technological Institute 2145 Sheridan Road Evanston, Illinois 60208-3125 Department of Engineering Sciences and Applied Mathematics

Phone 847-491-3345 Fax 847-491-2178



November 26, 2007

Dear Colleague,

I am writing to strongly recommend Confidential for admission to your graduate program related to biomedical research. Con is a student who is ideally suited for advanced graduate study.

I have served as Confidential is applied mathematics major advisor for the past 2.5 years; in this capacity we meet at least once per quarter. Con is scheduled to graduate in the spring of 2008, a double major in Applied Mathematics and Biomedical Engineering. Con is both a self-directed and a mature student, and so it has been effortless, although still rewarding, to advise him. In addition, I was Con is instructor for his Complex Variables course (ESAM 311-3), which he took at the end of his sophomore year. Con is also an undergraduate research assistant working with me and Professor Malcolm MacIver of Northwestern's mechanical and biomedical engineering departments on a problem related to optimal control and fish locomotion. It is largely on the basis of this last interaction with Con that I can so strongly recommend him for graduate study. He is not only a very smart and capable student, but he is one that is suited to pursuing research because of his scientific curiosity and his intellectual drive.

During the spring of his sophomore year Con was one of three sophomores who took my Complex Variables course. The other students in this advanced undergraduate course were primarily graduate students. Complex variables is the third course in a year long sequence in Methods of Applied Mathematics. Our engineering and applied mathematics students find complex variables to be a fairly abstract applied mathematics course; they must first learn the mathematical foundations and calculus of complex-valued functions before they can move on to any familiar areas of application. The course requires a level of mathematical sophistication very few sophomores have gained. Con received an A- in my course. For a sophomore to be able to do this well in the complex variables course is unusual. I enjoyed having Con in class; he does not draw a lot of attention to himself, yet he is engaged and he asks good questions. He is a serious student, with an excellent mathematical mind, and is someone who loves problem solving. I expect he has the makings to be a highly effective researcher. Con will not give up on a problem once it gets his attention.

Starting in the summer of 2007 Con joined a research effort I have with Prof. MacIver, who is an expert on sensing and locomotion of weakly electric fish. (I have a graduate student and a postdoc who have been working along with us on this project.) This interdisciplinary research problem is related to optimal control and fish locomotion. I expect our paper, currently in preparation, to be submitted for publication by the end

of 2007, and Con will be a co-author. Specifically, our effort has been aimed at a comparison of optimal solutions (according to some cost function) of a highly idealized mechanical 'fish' model with 'true solutions' of the exact problem, namely those obtained as motion-capture data from MacIver's laboratory fish tank. Con 's contributions have related to the matlab-based computer interface that allows us to view the trajectories in a variety of three-dimensional renderings. He has also run the optimization software, and developed some diagnostics for determining the extent to which the laboratory fish bends to realize a particular motion. The latter grew out of Con 's observation that the optimal trajectories are closer to the true trajectories in the instances that the fish does not bend much. Thus, Con not only processed the data for us, but also examined it and came back with his own hypothesis about it, which proved to be an interesting one for us to pursue with our data set. Although the most junior member of our team, Con nonetheless speaks up with ideas and questions at all of our weekly meetings.

In summary, Confidential is a smart, articulate, self-directed, and motivated student, who is easy to talk with and easy to engage in discussions around mathematics and engineering. He has broad intellectual interests and an easy-going personality, and I know, from experience, that he will contribute well to any team effort. I highly recommend to your program. He has a lot to offer, and I fully expect him to be successful in this pursuit. If you need any additional information, please do not hesitate to contact me.

Sincerely Yours,

Mary Silber

Professor

Eng. Sciences & Applied Math.

Northwestern University

(847) 491-8782

m-silber@northwestern.edu

## MIT Evaluation for Graduate Admission

Return to: Please read instructions carefully before you complete this form. Department of Massachusetts Institute of Technology 77 Massachusetts Avenue, Room Part 1 To be completed by all applicants Cambridge, MA 02139-4307 Please type or print using black ink. Important: In the upper right of this form, fill in the return address department name and room number (as indicated on pages 4-16 of this booklet). Name: Confidential Applying for admission in the department of Health Sciences and Technology area of research MEMP for the ultimate degree of Ph.D. Confidential for the term beginning in September 2008 Under the Family Educational Rights and Privacy Act of 1974, a student enrolled at MIT has access to his or her education records. We intend to comply with both the letter and the spirit of this law, while still allowing the student the option of waiving the right to access. If you wish to waive the right to examine this evaluation at a later date, please sign here. Applicant's signature: Confidential Part 2 To be completed by evaluator An application for admission to MIT requires evaluations from three teachers or people capable of judging the professional and academic promise of the applicant. A separate letter of evaluation may be attached to this form if necessary. Please return in time for her/him to meet the following deadlines: January 15 for June or September admissions for applicants except as follows: December 15 for Aeronautics and Astronautics, Architecture, Biology, Brain and Cognitive Science, Chemistry, Electrical Engineering and Computer Science, Health Sciences and Technology, Leaders for Manufacturing (see http://lfm.mit.edu for additional details), Mechanical Engineering, Media Arts and Sciences; December 15 for Operations Research; December 31 for Biological/Engineering and Political Science; January 1 for Physics and Science, Technology and Society; January 2 for Chemical Engineering, Civil and Environmental Engineering, Economics, Linguistics and Philosophy, Mathematics; January 3 for Urban Studies and Planning; January 5 for Earth, Atmospheric and Planetary Sciences; January 7 for Nuclear Science and Engineering; January 10 for Computation for Design and Optimization, Engineering Systems Division and Technology and Policy Program; and February 15 for Center for Real Estate. November 1 is the deadline for the February term. January 12 and April 6 are the deadlines for Round 1 and Round 2, respectively, for the Master of Engineering in Logistics (MLOG) Program. For the Evaluation Form, please go to http://www.mit.edu/mlog/. For the Systems Design and Management Evaluation Form, please go to http://sdm.mit.edu. Evaluator's name: Malcolm MacIver Title Assistant Professor Address 922 W Fullerton Ave #2 Chicago 60614-2407 **United States** email maciver@northwestern.edu Date 12-06-2007 School or company Northwestern University \_\_\_\_\_Telephone number\_773-793-8523 In what capacity do you know the applicant? Undergraduate Research Advisor How long have you known the applicant? 6 months How does this applicant compare with his or her peer group in academic ability? X Truly exceptional Outstanding ■Well above average ■Above average Below average Inadequate opportunity Average equivalent to the very best comparable to the top 25% demonstrated high able to complete lower 50% to observe you have known - a person best student in a ability work to the Ph.D. who, in your experience, current class appears only every few years In your opinion, how would this student compare to other students in the graduate program at MIT? ☐Well above average ☐Above average ☐Average X Truly exceptional Outstanding Below average Inadequate opportunity to observe Please give the applicant's relative standing in your department (e.g., 7th in 89) In the top ten out of 50 in the BME cohort

pendent projects will be particularly helpful. If you know of other students who have entered MIT from your institution, a comparison will be especially valuable. If you have any reason to believe that the applicant should not be considered, please explain. Northwestern University If the applicant's first language is not English, please evaluate her/his proficiency to read, write, and speak English. \_ Not applicable. Evaluator's signature Malcolm MacIver 12-06-2007 Evaluators: Please feel free to add information about your own educational and professional background if you feel that such information will enhance our understanding of your evaluation.

Personal evaluation of the applicant. What particularly qualifies this student for study at MIT? Information about accomplishments in research or inde-

Please seal and sign the envelope.

#### **McCormick**

Robert R. McCormick School of Engineering and Applied Science

Northwestern University D157 Technological Institute 2145 Sheridan Boad Evanston, Illinois 60208-3111 Malcolm A. Maclver Assistant Professor Department of Biomedical Engineering Department of Mechanical Engineering

maciver@northwestern.edu Phone 847-491-3540 eFax 847-556-0173 www.neuromech.northwestern.edu



December 6, 2007

Department of Health Sciences and Technology MIT

Dear HST Application Review Committee Member,

I'm happy to write a letter of recommendation for Confidential , who has applied for entry into your HST graduate program. I am an Assistant Professor with joint appointments in the Biomedical and Mechanical Engineering Departments of Northwestern University. I am primarily involved in the Neural Engineering Program. My area of research is understanding the ways in which the mechanics of the body contribute to adaptive behavior, particularly behaviors which require sensory feedback for successful completion.

Over the past six months, I have met once or twice a week with Con to guide work he has been doing with myself, a faculty member in Applied Math (Mary Silber), and a graduate student and post-doctoral fellow. We have been performing an analysis of the motion of weakly electric fish, a model system for understanding sensory processing in vertebrates, to determine to what extent their movements are mechanically optimal. Our hypothesis was that the observed movements, which another part of the work of my lab is assessing for sensory optimality, are mechanically optimal, and that the basis for the pattern of thrust capability of the body is that the way in which the animal generates thrust is what is necessary to obtain mechanically optimal trajectories. The work is complex, and spans idealized ellipsoidal models for optimal control analysis, and comparison of the optimal control results with empirical results.

Con has been a key person in the work to compare the optimal control results to the empirical results. I have been consistently impressed with his capabilities. Some months after he joined the project, it was evident that his contributions warranted co-authorship on the major paper we are currently writing to report our results. Besides his rapid ability to absorb the needs of a research study and translate these into analysis code to generate the necessary results, Con has also contributed critical assessments of large number of problems that have arisen as we have pursued completion of this project. This is a testament to the quality of his thinking, since most students in his position would not have the confidence in their thought processes to bring up a critical note in the presence of two professors and one postdoc. As one of many examples of his critical thinking skills, he identified two patterns of behavior we hitherto had been aware of in the empirical kinematic data which were leading to disagreement with the optimal control results. One concerned cases where the fish's trunk was bent at the onset of the behavior, and the other is a situation in which, in certain trials, the fish would move quickly initially but then "loiter" as it got close to the prey.

would make an excellent student in your program. He is easily among the top three students I've had the pleasure to mentor in my lab, out of a very select group of about 15 undergraduate students. I have no hesitation in giving him the strongest recommendation. Please feel free to contact me should any further details be needed.

M. Vanh

Sincerely,

M. MacIver

# MIT Evaluation for Graduate Admission

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Applying for admission in	he department of	Health Sciences ar	d Technology			·
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Part 2 To be completed	by evaluator					
An application for admission A separate letter of evaluation			rs or people capable of	f judging the profession	onal and academic pro	omise of the applicant.
December 15 for Operation Society; January 2 for Chen Urban Studies and Planning Computation for Design ar Estate. November 1 is the dof Engineering in Logistics Evaluation Form, please go Evaluator's name: Matthe	nical Engineering, Ci g: January 5 for Earth ad Optimization, En eadline for the Febru (MLOG) Program. to http://sdm.mit.ec	ivil and Environmental I o, Atmospheric and Plan gineering Systems Divisi uary term. January 12 ar For the Evaluation Form	Engineering, Econometary Sciences; Januar on and Technology and April 6 are the dead, please go to http://www.commonseries.com/	ics, Linguistics and I y 7 for Nuclear Scien nd Policy Program; dlines for Round 1 a	Philosophy, Mathem nce and Engineering and February 15 for and Round 2, respec	atics; January 3 for ; January 10 for Center for Real tively, for the Master
Address BME Dept		Evanston	<u> </u>	60657	USA	
email_m-glucksberg@	northwestern.ed	lu		Date_	12-16-2007	
School or company North	western Univers	sity	Telephor	ne number <u>84749</u>	17121	
In what capacity do you kn	ow the applicant?_	Teacher				
How long have you known	the applicant? 1 y	ear				
How does this applicant co	mpare with his or h	er peer group in academ	ic ability?			
Truly exceptional equivalent to the very best you have known – a person who, in your experience, appears only every few years	Outstanding comparable to the best student in a current class	<b>X</b> Well above average top 25%	Above average  demonstrated high  ability	Average  able to complete  work to the Ph.D.	Below average lower 50%	☐ Inadequate opportunity to observe
In your opinion, how wou	ld this student comp	pare to other students in	the graduate program	n at MIT?		
☐ Truly exceptional	Outstanding	$\overline{\mathbf{X}}$ Well above average	☐Above average	□Average	☐Below average	Inadequate opportunity
Please give the applicant's r	elative standing in y	our department (e.g., 7	th in 89) Unknow	n		to observe

valuable. If you have any reason to believe that the applicant should not be considered, please explain. He is an independent and thoughtful person, and quite creative by nature. His grades are very good, and he has demonstrated the ability to lead by example. He is quick to volunteer for community service activities and shows true concern for his fellow man. Technically he possesses both impressive analytical skills and a sharp intuition about problems in mechanics. If the applicant's first language is not English, please evaluate her/his proficiency to read, write, and speak English. He speaks as a native english speaker, but I believe his first language is Russian. Evaluator's signature Matthew Glucksberg 12-16-2007 Evaluators: Please feel free to add information about your own educational and professional background if you feel that such information will enhance our understanding of your evaluation.

Personal evaluation of the applicant. What particularly qualifies this student for study at MIT? Information about accomplishments in research or independent projects will be particularly helpful. If you know of other students who have entered MIT from your institution, a comparison will be especially

I am pleased to offer my recommendation for Confidential to your program. I know Conprimarily from our Global Healthcare Technology program at the University of Cape Town. In the program a dozen or more undergraduates and graduate students take courses in helath care technology management and in biomedical engineering design for the developing world. Con's group worked with a local hospital bed manufacturing company to develop more robust inexpensive beds for the primary care clinics in South Africa. Con is by nature a quiet observer and this quality served him well as he and his group explored the stresses that beds are exposed to in a variety of clinics throughout the western cape, and especially in the townships surrounding Cape Town. Con's keen observations and his contributions to the redesign of key components of the basic model of hospital bed proved to be of great value to the company. Con is a solid engineer and a good student who will do well in any graduate program.



### **GRADUATE INSTITUTION REPORT OF SCORES**

SCHOOL CODE: 3514 DEPT. CODE: 5199

LAST NAME:			
FIRST NAME:			
ADDRESS:			
		Confidential	

BIRTH DATE SOCIAL SECURITY NUMBER	ery	Most F		
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NS: No Score. Indicates that no questions were answered in this section.

Analytical Writing scores earned from the stand-alone administration and/or Writing Assessment scores earned between October 1, 2002, and December 31, 2003.

SUBJECT TEST							
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