

COLLEGE OF ENGINEERING
Faculty Activity Summary

Date: February 22, 2017

Name: David W. Murhammer

Social Security No:

Academic Rank and Date Appointed (Mo/Yr): Professor, 7/2003

Date of First University of Iowa Appointment (Mo/Yr): November 15, 1989

Department: Chemical & Biochemical Engineering

Office Address: 4132 Seamans Center

Office Phone: 335-1228

Home Address: 224 North 7th Avenue
Iowa City, Iowa 52245-6000

Home Phone: 338-1348

Birthplace & Date: Salem, Oregon - August 22, 1957

Spouse's Name, if Applicable (Optional): Joan M. Murhammer

Highest Academic Degree: Ph.D.

Special Fields of Knowledge: Biochemical Engineering, Insect Cell Culture, Mammalian Cell Culture, Oxidative Stress in Cell Culture; Mass Production of Virus Insecticides, Chemical Process Safety

Present Research Interests:

Continuous baculovirus bioinsecticide production; Oxidative stress in baculovirus infected insect cell culture; Development of cell culture systems with improved representation of *in vivo* characteristics; Chemical Process Safety

Present Course Teaching Preferences:

(List courses by course number and title in descending order of teaching preference)

Program Courses (List at least five)

1. CBE:3125 Chemical Process Safety
2. CBE:5205 Introduction to Biochemical Engineering
3. CBE:2030 Energy and Society
4. CBE:3110 Engineering Flow and Heat Exchange
5. CBE:2105 Process Calculations

Core Courses (List at least two)

1. ENGR:2130 Engineering Fundamentals III: Thermodynamics

NOTE: THIS PAGE IS LIMITED TO THE INFORMATION REQUESTED AND THAT INFORMATION IS LIMITED TO THE SPACE PROVIDED.

1. Academic Background

<u>Institution</u>	<u>Dates Attended</u>	<u>Major</u>	<u>Degree</u>	<u>Dates Awarded</u>
Oregon State University	1975-9	Chemistry	B.S.	1979
Oregon State University	1980-2	Chem. Engr	M.S.	1982
University of Houston	1984-9	Chem. Engr.	Ph.D.	1989

2. Professional Experience

2.1 Academic

<u>University</u>	<u>Position</u>	<u>Dates</u>	<u>Main Courses Taught</u>
University of Iowa	Asst. Professor	11/89-7/98	Biochemical Engineering (52:180)
University of Iowa	Assoc. Prof.	7/98-7/2003	Bioseparations (52:181)
University of Iowa	Professor	7/2003-	Intro to Biochem. Engineering (52:108) Process Calculations (52:041) Advanced Thermodynamics (52:117) Engr. Aspects of Animal Cell Culture (52:280) Unit Operations Laboratory I (52:047) Unit Operations Laboratory II (52:048) Engineering I (57:005) Momentum Transport (52:042) Chemical Process Safety (52:087/52:187) Intermediate Chemical Reaction Kinetics (52:145) Engineering Flow and Heat Exchange (52:151) First-Year Seminar (52:029) Professional Seminar (52:091)
University of Iowa	CBE DEO	7/2007-7/2012	Chemical Process Design I (52:184) Thermo/Transport Lab (52:171)
University of Iowa	Professor	7/2012-present	

2.2 Industrial

<u>Company</u>	<u>Position</u>	<u>Dates</u>
Teledyne Wah Chang Albany	Research Engineer	1982-84

2.3 Other

None.

3. Professional Activities

3.1 Scientific and Professional Societies

American Association for the Advancement of Science
American Chemical Society
American Institute of Chemical Engineers
American Society for Engineering Education
Society for Free Radical Biology and Medicine

3.2 Professional Registration

None (Iowa Registration expired in 2001)

3.3 Honors, Prizes, and Awards

Fellowship, University of Houston, 1984-89
Old Gold Summer Fellowship, 1990

Nominated for Tau Beta Pi teaching award, 1991
AIChE Outstanding Student Chapter Award, 1992-96, 1998-2002, & 2004-present
Outstanding AIChE Student Chapter Advisor Award, 1996
Patents and Literature Review Editor, *Appl. Biochem. Biotechnol.*, 1994-98
Collegiate Outstanding Teaching Award, 2001
Associate Editor, *Appl. Biochem. Biotechnol.*, 2003-2009
Editor, *Baculovirus and Insect Cell Expression Protocols*, 2nd ed., published in 2007
Editorial Board, *Appl. Biochem. Biotechnol.*, 2009-present
Inducted into the Santiam Canyon School District (Mill City, OR) Hall of Fame,
November 2012
Editor, *Baculovirus and Insect Cell Expression Protocols*, 2nd ed., published in 2007
Editor, *Baculovirus and Insect Cell Expression Protocols*, 3rd ed., published in 2016

3.4 Consulting

Biosys (Palo Alto, CA), 1995-96
Chiron (Emeryville, CA), 1996
Novavax (Rockville, MD), 2012

3.5 Patents and Disclosures

"Gp64-specific monoclonal antibodies for the detection of baculovirus-infected insect cells and for virus quantification", disclosure submitted to the University of Iowa Research Foundation on May 12, 1995.

3.6 Other (Partial Listings)

Served as an external reviewer in the ISU competitive grants program for agricultural biotechnology, 1990.
Chairman of the General Papers and Poster sessions (Biochemical Technology Division) at the 200th ACS National Meeting, Washington, D.C., August, 1990.
Co-Chairman of the Biochemical Engineering session at the Second Pan American Chemical Congress, San Juan, Puerto Rico, September, 1991.
Membership Committee Chairman for the Biochemical Technology Division of the American Chemical Society, 1992-98.
Co-Chairman of the Poster session (Division of Microbial and Biochemical Technology) at the Spring National ACS Meeting, San Francisco, CA, April, 1992.
Co-Chairman of the Environmental Effects on Metabolism and Product Expression Kinetics at the 1992 AIChE National Meeting, Miami, FL, November, 1992.
Co-Chairman of the General Papers Session (Biochemical Technology Division) at the Spring National ACS Meeting, Denver, Co, April, 1993.
Chemical and Biochemical Engineering Representative on the executive committee of the Biocatalysis and Bioprocessing Center at the University of Iowa. 1994-98.
Recruitment committee chairman for the Biocatalysis and Bioprocessing Center at the University of Iowa. 1994-96.
Co-Chairman of the Prokaryotic and Eucaryotic Systems for Protein Production session at the 1995 AIChE National Meeting, Miami, FL, November, 1995.
Served on review panel that evaluated proposals submitted to the Instrumentation and Laboratory Improvement Program at the National Science Foundation, 1995.
Served on Center for Biocatalysis and Bioprocessing Organization Committee for BIOCATS meeting, 1995.

Reviewed proposal for Biotechnology Program at the National Science Foundation, 1995

Chairman of the subcommittee to formulate the 1999 AIChE National Student Chapter Competition, 1996-98.

AIChE Student Chapter Committee liaison to the Mid-America Regional Conference, 1998-present

AIChE Student Chapter Committee, 2nd Vice-Chair, 1998-99

Co-Chairman of the Advances in Animal and Insect Cell Culture session at the 1999 AIChE National Meeting, Dallas, TX, November, 1999.

AIChE Student Chapter Committee, 1st Vice-Chair, 1999-2000

Co-Chairman of the Advances in Animal and Insect Cell Culture session at the 2000 AIChE National Meeting, Los Angeles, CA, November, 2000.

AIChE Student Chapter Committee, Chair, 2000-2001.

Co-Chairman of the Advances in Animal and Insect Cell Culture session at the 2001 AIChE National Meeting, Reno, NV, November, 2001.

AIChE Awards Subcommittee, Student Chapters Committee, Member, 2004-present.

Chair of the AIChE Awards Subcommittee, Student Chapters Committee, 2013-present.

Chair of the ChemE Jeopardy Subcommittee, Student Chapters Committee, 2013-present.

ChemE Car Safety Coordinator, 2013 AIChE Mid-America Regional Conference, held at the University of Oklahoma

ChemE Car Safety Coordinator, 2014 AIChE Mid-America Regional Conference, held at the University of Iowa

ChemE Car Safety Coordinator, 2015 AIChE Mid-America Regional Conference, held at the University of Kansas

ChemE Car Safety Coordinator, 2016 AIChE Mid-America Regional Conference, held at Kansas State University

ChemE Car Safety Coordinator, 2017 AIChE Mid-America Regional Conference, held at the University of Tulsa

4. Service Activities

4.1 Department (Partial Listings)

Chemical Engineering faculty secretary, 1989-96

Faculty advisor for professional seminar and AIChE student chapter, 1990-96, 1998-present

Faculty advisor for freshman seminar, 1993-94

Curriculum committee chairman, 1997-2002, 2006-2007

Curriculum committee member, 1997-2007

Faculty search committee, 1998-2000

Graduate student recruitment committee, 1999-2007

ABET committee chairman, 2000-2002

Strategic Plan committee member, 2013

4.2 College (Partial Listings)

Engineering faculty secretary, 1990-91

Judge, Summer Institute for Creative Engineering and Inventiveness, 1991 and 1995

Engineering Teaching Committee member (Fall, 1992)

Engineering Curriculum Committee member (Spring, 1993)

Participated in Engineering Open House (many times)

Participated in Scholars' Day (many times)

College Lectures Committee, 1997-98
Engineering Faculty Council, member, 1998-2001
Engineering Faculty Council, Secretary, 2000-2001
Ad Hoc College ABET Group Member, 2000-2007
Engineering Curriculum Committee member, 2001-2004
Engineering Curriculum Committee, Chair, 2002-03
Dean's Advisory Promotion and Tenure Committee member, 2006-2007
Dean's Advisory Promotion and Tenure Committee member, 2013-2015

4.3 University (Partial Listings)

Member of Faculty/Staff parking appeals committee, 1990-1996
Served on Goldwater Scholarship Faculty Nomination Committee, 1994 and 1995
Basic Science Subcommittee, University Radiation Protection Committee, 1995-98
Biological Sciences Advisory Committee, 1998-99
Biological Sciences Proposal Review, 2008

4.4 Community, State, National and International (Partial Listings)

Judge, Upper Iowa University Science Fair, 1990
Volunteered (AIChE Student Chapter) at the IC Senior center, 1990-96
CROP Walk (AIChE Student Chapter), 1994
Judge at Regina Elementary Invent Iowa Competition, 2006-2010, 2016-present
Member, Project Lead The Way, Regina H.S. Advisory Board, 2010-present

4.5 Student Related

4.5.1 Advisor to Student Groups

AIChE Student Chapter (professional seminar), 1990-96, 1998-present
Chemical Engineering Freshmen Seminar, 1993-94

4.5.2 Special Counseling Services

None.

4.5.3 Other Student Services

None.

4.6 Other (Partial List)

Recruitment for chemical engineering graduate students at Luther College (November 26, 1990) and at Loras College (January 22, 1991). Gave seminars to chemistry, biology, etc. students about chemical engineering at the University of Iowa and about chemical engineering in general with the intent of encouraging these students to consider graduate studies in chemical engineering at the University of Iowa.

Participated in the visit of 5 potential graduate students to the Department of Chemical and Biochemical Engineering at the University of Iowa (March 9, 1991). My contribution consisted of giving introductory comments about our program to the students, talking to each of the students individually, etc.

Recruitment for graduate students at the University of Puerto Rico at Mayaguez (September 23, 1991). This consisted of manning a booth at a graduate school fair held at the student union and talking to students about general graduate opportunities at the University of Iowa. In addition, I discussed graduate opportunities in chemical engineering at the University of Iowa to some students in the Chemical Engineering Department at the University of Puerto Rico.

5. Teaching Activities

5.1 Courses Taught

Sem.	Course Number	Course Title	Sem Hrs	No. of Students	Remarks
Sp 1990	52:091	Professional Seminar	0	34	
Sp 1990	52:146	Biochemical Engineering	3	11	
Su 1990	52:181	Bioseparations	3	7	
Fa 1990	57:013	Engineering Biological Science	3	31	
Fa 1990	52:091	Professional Seminar	0	36	
Sp 1991	52:041	Process Calculations	3	22	
Sp 1991	52:091	Professional Seminar	0	31	
Sp 1991	52:180	Biochemical Engineering	3	16	
Su 1991	52:117	Advanced Thermodynamics	3	5	
Fa 1991	57:013	Engineering Biological Science	3	26	
Fa 1991	52:091	Professional Seminar	0	37	
Sp 1992	52:041	Process Calculations	3	38	
Sp 1992	52:091	Professional Seminar	0	41	
Sp 1992	52:280	Engr Aspects Cell Culture	3	8	
Su 1992	52:117	Advanced Thermodynamics	3	7	
Fa 1992	57:005	Engineering I (Discussion)	2	~40	
Fa 1992	52:047	Unit Operations Lab I	2	16	
Fa 1992	52:091	Professional Seminar	0	50	
Sp 1993	52:048	Unit Operations Lab II	2	16	
Sp 1993	52:091	Professional Seminar	0	55	
Fa 1993	52:047	Unit Operations Lab I	2	26	
Fa 1993	52:090	Freshmen Seminar	0	17	
Fa 1993	52:091	Professional Seminar	0	56	
Fa 1993	52:108	Intro Biochem Engr	3	34	
Sp 1994	52:048	Unit Operations Lab II	2	26	
Sp 1994	52:090	Freshmen Seminar	0	23	
Sp 1994	52:091	Professional Seminar	0	52	
Fa 1994	57:005	Engineering I (Discussion)	2	~40	
Fa 1994	52:042	Momentum Transport	3	31	
Fa 1994	52:091	Professional Seminar	0	75	
Sp 1995	52:042	Momentum Transport	3	37	
Sp 1995	52:091	Professional Seminar	0	85	
Fa 1995	52:041	Process Calculations	3	43	
Fa 1995	52:091	Professional Seminar	0	89	
Fa 1995	52:117	Advanced Thermodynamics	3	9	
Sp 1996	52:087	Chemical Process Safety	3	22	
Sp 1996	52:091	Professional Seminar	0	~90	
Fa 1996	52:041	Process Calculations	3	36	
Fa 1996	52:091	Professional Seminar	0	~90	
Sp 1997	52:087	Chemical Process Safety	3	32	
Sp 1997	52:280	Engr Aspects Cell Culture	3	5	
Fa 1997	52:108	Intro Biochem. Engr.	3	35	
Sp 1998	52:042	Momentum Transport	3	40	
Sp 1998	52:087	Chemical Process Safety	3	29	
Fa 1998	57:005	Engr. I Discussion (2 sec)	1	50	

Fa 1998	52:091	Professional Seminar	0	~80
Sp 1999	52:042	Momentum Transport	3	35
Sp 1999	52:187	Chemical Process Safety	3	33
Sp 1999	52:091	Professional Seminar	0	~80
Sp 2000	52:187	Chemical Process Safety	3	27
Sp 2000	52:091	Professional Seminar	0	~80
Fa 2000	52:280	Engr. Aspect Cell Culture	3	10
Fa 2000	52:091	Professional Seminar	0	~80
Sp 2001	52:042	Momentum Transport	3	15
Sp 2001	52:187	Chemical Process Safety	3	26
Sp 2001	52:091	Professional Seminar	0	~60
Fa 2001	52:145	Inter. Chem. Reac. Kinetics	3	9
Fa 2001	52:091	Professional Seminar	0	~50
Sp 2002	52:042	Momentum Transport	3	19
Sp 2002	52:187	Chemical Process Safety	3	12
Sp 2002	52:091	Professional Seminar	0	41
Fa 2002	52:145	Inter. Chem. Reac. Kinetics	3	8
Fa 2002	52:091	Professional Seminar	0	~50
Sp 2003	52:042	Momentum Transport	3	19
Sp 2003	52:187	Chemical Process Safety	3	19
Sp 2003	52:091	Professional Seminar	0	41
Fa 2003	52:145	Inter. Chem. Reac. Kinetics	3	13
Fa 2003	52:091	Professional Seminar	0	38
Sp 2004	52:151	Engr Flow Heat Exchange	3	39
Sp 2004	52:187	Chemical Process Safety	3	18
Sp 2004	52:091	Professional Seminar	0	23
Fa 2004	52:041	Process Calculations	3	17
Fa 2004	52:108	Intro Biochem Engineering	3	23
Fa 2004	52:091	Professional Seminar	0	34
Sp 2005	52:151	Engr. Flow Heat Exchange	3	27
Sp 2005	52:091	Professional Seminar	0	42
Fa 2005	52:041	Process Calculations	3	19
Fa 2005	52:108	Intro Biochem Engineering	3	19
Fa 2005	52:091	Professional Seminar	0	39
Sp 2006	52:187	Chemical Process Safety	3	17
Sp 2006	52:029	First-Year Seminar	1	14
Sp 2006	52:091	Professional Seminar	0	48
Fa 2006	52:226	Engr Aspects Cell Culture	3	8
Fa 2006	52:029	First-Year Seminar	1	12
Fa 2006	52:041	Process Calculations	3	13
Fa 2006	52:091	Professional Seminar	0	44
Fa 2006	52:108	Intro Biochem Engineering	3	3
Sp 2007	52:187	Chemical Process Safety	3	25
Sp 2007	52:029	First-Year Seminar	1	13
Sp 2007	52:091	Professional Seminar	0	41
Fa 2007	52:029	First-Year Seminar	1	12
Fa 2007	52:091	Professional Seminar	0	51
Fa 2007	52:108	Intro Biochem Engineering	3	19
Sp 2008	52:029	First-Year Seminar	1	13

Sp 2008	52:091	Professional Seminar	0	54
Sp 2008	52:151	Engr. Flow Heat Exchange	3	28
Fa 2008	52:029	First-Year Seminar	1	13
Fa 2008	52:030	Energy & Society	3	22
Fa 2008	52:091	Professional Seminar	0	40
Sp 2009	52:029	First-Year Seminar	1	12
Sp 2009	52:091	Professional Seminar	0	59
Sp 2009	52:151	Engr. Flow Heat Exchange	3	38
Sp 2009	52:187	Chemical Process Safety	3	22
Fa 2009	52:029	First-Year Seminar	1	11
Fa 2009	52:091	Professional Seminar	0	60
Fa 2009	51:184	Chem Proc. Design I	3	20
Sp 2010	52:090	CBE Dept Seminar	0	19
Sp 2010	52:091	Professional Seminar	0	78
Sp 2010	52:187	Chemical Process Safety	3	38
Fa 2010	52:029	First-Year Seminar	1	12
Fa 2010	52:091	Professional Seminar	0	74
Fa 2010	52:184	Chem Proc. Design I	3	41
Sp 2011	52:091	Professional Seminar	0	64
Sp 2011	52:187	Chemical Process Safety	3	40
Fa 2011	52:029	First-Year Seminar	1	14
Fa 2011	52:091	Professional Seminar	0	59
Fa 2011	52:184	Chem. Proc. Design I	3	34
Sp 2012	52:091	Professional Seminar	1	67
Sp 2012	52:187	Chemical Process Safety	3	23
Fa 2012	52:029	First-Year Seminar	1	17
Fa 2012	52:091	Professional Seminar	1	60
Fa 2012	52:171	Thermo/Transport Lab	3	32
Fa 2012	52:184	Chem. Proc. Design I	3	25
Sp 2013	52:091	Professional Seminar	1	59
Sp 2013	52:187	Chemical Process Safety	3	30
Fa 2013	CBE:3000	Professional Seminar	1	62
Fa 2013	CBE:4109	Chem. Proc. Design I	3	25
Fa 2013	CBE:1180	First-Year Seminar	1	18
Fa 2013	CBE:3150	Thermo/Transport Lab	3	26
Sp 2014	CBE:3000	Professional Seminar	1	94
Sp 2014	CBE:3125	Chemical Process Safety	3	28
Fa 2014	CBE:3000	Professional Seminar	1	83
Fa 2014	CBE:5205	Biochemical Engineering	3	29
Fa 2014	HONR:1300	First-Year Seminar	1	17
Fa 2014	CBE:4109	Chem. Proc. Design I	3	28
Sp 2015	CBE:3000	Professional Seminar	1	109
Sp 2015	CBE:3125	Chemical Process Safety	3	65
Fa 2015	CBE:3000	Professional Seminar	1	99
Fa 2015	CBE:5205	Biochemical Engineering	3	63
Fa 2015	CBE:1180	First-Year Seminar	1	19
Fa 2015	CBE:3150	Thermo/Transport Lab	3	38
Sp 2016	CBE:3000	Professional Seminar	1	96
Sp 2016	CBE:3125	Chemical Process Safety	3	41

Fa 2016	CBE:3000	Professional Seminar	1	78
Fa 2016	CBE:5205	Biochemical Engineering	3	37
Fa 2016	CBE:1180	First-Year Seminar	1	12
Fa 2016	CBE:3150	Thermo/Transport Lab	3	46
Sp 2017	CBE:3000	Professional Seminar	1	104
Sp 2017	CBE:3125	Chemical Process Safety	3	42
Sp 2017	CBE:3110	Engineering Flow & Heat	3	56

5.1.1 Project Lead The Way Courses Taught

Su 2006	Received Training to serve as an Affiliate Professor for the PLTW Biotechnical Engineering (BE) course, Purdue Univ., Kokomo, IN campus
Su 2007	Served as Affiliate Professor for BE course for high school teachers
Su 2008	Served as Affiliate Professor for BE course for high school teachers
Su 2009	Served as Affiliate Professor for BE course for high school teachers
Su 2010	Served as Affiliate Professor for BE course for high school teachers
Su 2011	Served as Affiliate Professor for BE course for high school teachers
Su 2012	Served as Affiliate Professor for BE course for high school teachers
Su 2013	Served as Affiliate Professor for BE course for high school teachers
Su 2015	Received Training to serve as Affiliate Professor for the PLTW Environmental Sustainability (ES) course
Su 2015	Served as Affiliate Professor for ES course for high school teachers
Su 2016	Received Training to serve as Affiliate Professor for the PLTW Principles of Biomedical Science (PBS) course

5.2 Graduate Student Advising and Committees

5.2(a) Ph. D. Dissertation Supervision

<u>Student</u>	<u>Compl. Date</u>	<u>Topic</u>	<u>Award</u>	<u>Next Position After Leaving Group</u>
Murali Krishna Pasumarthy	1994	Selection and development of insect cell lines for recombinant protein production		Principal Engineer Baxter Biosciences
Christine Mitchell-Logean	1997	Effects of bcl-2 expression on insect cell viability, productivity and morphology and characterization of Sf-9 and High Five™ cell suspension cultures		Process Improvement Specialist (Cell Culture) Sereno (Switzerland)
Martin Rhiel	1998	Application of near-infrared spectroscopy to bioreactor monitoring		Scientist, Process Development Cytos Biotech (Switzerland)
Michael Wolff	1999	Extension of the glycoprotein processing capabilities of the		Project Manager (Cell Culture)

		lepidopteran insect cell line <i>Spodoptera frugiperda</i> by metabolic engineering	Sympore (Germany)
Mark Saarinen	2001	Effects of dissolved oxygen concentration on oxidative stress and recombinant protein production in insect cells	Post-Doctoral Associate USDA Beltsville, MD
Chin Ng	2004	Three dimensional mass transport modeling of the NASA high aspect ratio rotating vessel	?? (Co-advised by V. Rodgers)
Patricia Rose	2005	FP25K and Multiplicity of Infection Impact <i>Autographa californica</i> Multiple Nucleopolyhedrovirus Polyhedra Production and Gene Expression	Engineer Schering Plough
Sybil Hrstka	2005	Engineering therapeutic proteins	?? (Co-advised by R. Linhardt)
Elena Bond	**	Overcoming oxidative stress in baculovirus infected insect cells	??

**Elena was a PhD student in the lab beginning in August 2003, but suffered from severe depression and did not return to the program after leaving from Winter Break in December 2007.

Lopamurda Giri	2009	Effect of genetic modification of the <i>fp25k</i> gene on few polyhedral and defective interfering particle mutations in baculovirus	Post-Doc at Univ. of Illinois
----------------	------	--	----------------------------------

5.2(b) M. S. Thesis Supervision

<u>Student</u>	<u>Compl. Date</u>	<u>Topic</u>	<u>Next Position After Leaving Group</u>	<u>Remarks</u>
Alexander Matschiner	1994	Development of a method for screening randomly mutated peroxidases using the baculovirus expression vector system	Research Associate, Human Genome Sciences, Inc., Rockville, MD	Officially, Jonathan Dordick's student, but I was effectively a co- advisor
Mark Saarinen	1999	Effect of the culture environment of the high-aspect ratio vessel on recombinant protein production in insect cell lines	See Above (Ph. D.)	
Gaurav Chauhan	2004	Countering the adverse effect of oxidative stress in virally infected insect cells	Research Associate Cell Sciences and Development SAFC Biosciences Lenexa, KS	
Bhakti Bapat	2009	Effect of CuZnSOD	??	

(DDU BS/MS Program)		homolog in baculovirus infection of insect cells	
Sucheta Vajrala	2010	Mechanism of carbon Dioxide inhibition in insect cell culture	MedImmune Rockville, MD
Bhakti Bapat	2014	Role of homolog CuZnSOD in baculovirus infection in insect cells	??

Note: Bhakti was dismissed from PhD program due to inability to complete the necessary requirements. In lieu of receiving a PhD, she completed an M.S. thesis. Her previous M.S. degree was non-thesis.

5.3(c) Ph. D. Committee Membership (only through early 1997)

<u>Student</u>	<u>Compl. Date</u>	<u>Topic</u>	<u>Remarks</u>
Woo Chul Shin	1990	Comprehensive air pollution modeling on multiprocessing environments; applications to regional scale problems	
Keungarp Ryu	1991	Peroxidase catalysis in nonaqueous media	
Timothy Wessel	1992	Effects of Promoters in the Direct Reaction of Silicon	
John Pollock (chemistry)	1993	Structural and reactivity properties of lacto- and fungal peroxidases	
Vikram Parakar	1993	Affinity based reverse micellar Extraction and separation (ARMES). A novel method of bioseparation based on affinity interactions	
Fahmi Abu Al-Rub	1994	Energy efficient methods for separation of biomass ethanol and water	
Yang Zhang	1994	Comprehensive study of dust and tropospheric ozone in east asia: a box model and 3-dimensional model (STEM-III) development and application	
Hoeil Chung (Chemistry)	1994	Near-Infrared Spectroscopy for Monitoring Acid Starch Hydrolysis, Bioreactor Components, and Clinical Glucose Levels	
Somchai Dechapanichkul	1994	Porous-walled reactor-separator for platinum catalyzed	

		methylcyclohexane dehydrogenation
James McEldoon	1995	Substrate specificity and thermal stability of plant peroxidases
Shengtian Pan (Chemistry)	1995	Design of the amperometric biosensors for glutamate, hydrogen peroxide, glucose; glucose measurement in a variable protein matrix with Ft-NIR
Pramod Wangikar	1995	Tailoring enzyme function in organic media
Kruvilla John	1995	Modeling analysis of the ozone problem in eastern United States: an assessment of the impact of changes in emissions and climate attributes
Prakob Kitchaiya	1995	Kinetics and thermodynamics of tertiary amyl ethyl ether (TAEE) synthesis on amberlyst 15
Xiangji Zhou (Chemistry)	1995	NIR spectroscopic monitoring of bioreactor components in cell culture and media; enzymatic fiber-optic biosensors for H ₂ O ₂ and glucose; chemical fiber-optic sensor for nitric oxide.
Brett Martin	1996	Biocatalytic synthesis and characterization of sugar-containing poly(acrylate)-based hydrogels
Geng Lu	1997	Near infrared spectroscopy glucose measurement in aqueous solutions using single beam spectra

Stopped adding these after this date, but average 2-3 committees/year.

5.3 Undergraduate Student Advising and Mentoring

5.3a Undergraduate Student Project Supervision (Incomplete List)

<u>Sem</u>	<u>Student</u>	<u>Project Description</u>	<u>Awards</u>
1990/91	Jennifer Doran	Improvement of serum-free medium for insect cell growth (UG Research)	
1990/91	Gary Machetta	The effect of carbohydrate source on insect cell growth (UG Research)	
1990/91	Erich Pflazgraf	The effect of surfactants on oxygen transport in sparged agitated bioreactors (UG Research)	Presented at Regional AIChE Paper Contest

1990/91	Denise Munoz	Effect of different serum sources on insect cell growth	
1991/92	Marty Moats	Insect cell line dependency of sensitivity to shear stress (UG Research)	
1991/92	Shahrul Zainol	Growth characteristics of the <i>Mamestra brassicae</i> Mb-O503 insect cell line (UG Research)	
1991/92	Ritu Bhatnager	Production of insect cell/mouse myeloma hybrids for improved recombinant protein synthesis (UG Research)	
1992/93	Steve Ernst	The effect of shear stress on cell morphology and cytoskeletal structure of insect cells. (UG Research)	2nd place in Regional AIChE Paper Contest
1992/93	Julie Muenchow	Transfection of insect cells with glycosyl transferase genes to improve recombinant protein glycosylation (UG Research)	
1992/93	Luke Stevens	Design of a continuous system for the production of viral insecticides (UG Research)	
1992/93	LaShawn Freeman	Improvement of protein glycosylation in insect cells by viral introduction of a glycosyltransferase gene (UG Research)	
1993/94	Joe Jacobson	Continuous Production of Viral Insecticides Without Defective Particle Synthesis (UG Research)	
1993/94	Kevin Dibel	Growth of host insect cells for gypsy moth virus production (UG Research)	
1993/94	Jennifer Mayer	Production of virus-like particles in insect cells for potential use as a vaccine for cervical cancer	Presented at Regional AIChE Paper Contest
1993/94	Karla Khuel	Altering the protein glycosylation capabilities of insect cells through co-expression of glycosyl transferases (UG Research)	
1994/95	Deborah Prendergast	Comparison of monolayer and suspension production of	

		recombinant proteins in insect cells (UG Research)	
1994/95	Elizabeth Gustavsen	Characterization of defective interfering particles in viral insecticide production (UG Research)	
1994/95	Jennifer Monroe	Protein production by High Five cells in suspension (UG Research)	
1994/95	Claudia Melara	Effect of shear on virally-infected insect cells (UG Research)	Presented at Regional AIChE Paper Contest
1994/95	Ryan Taber	Growth of insect cells and viral production in a plug flow bioreactor (UG Research)	
1994/95	Joe Ehle	Production of gypsy moth viral insecticides (UG Research)	
1994/95	Matthew Peterson	Growth of insect cells and viral production in a plug flow bioreactor (UG Research)	
1995/96	Robby Tanjung	Quantification of insect viruses through the use of monoclonal antibodies (UG Honors Project)	
1995/96	Kimberly Troutner	Effect of shear stress on insect cell morphology and integrity (UG Research)	Presented at the 1996 AIChE Regional Paper Contest - 3rd place
1995/96	Stacy Cooke	Effect of suspension cultures on the viral infection process and recombinant protein synthesis in insect cell cultures (UG Research)	Presented at the 1996 AIChE Regional Paper Contest
1995/96	Michelle Hillary	Utilization of cell culture techniques for studying prostate cancer (UG Research)	
1995/96	Jason Clarke	Synthesis of the C1 esterase inhibitor in insect cell cultures	
1995/96	Elizabeth	Utilizing recombinant DNA techniques	

	Gustavsen	to overcome the accumulation of few polyhedra mutants in continuous cell culture (UG Research)	
1996 (Sum)	Doug Carmichael	Purification of the insect virus gp64 protein (UG Research)	
1996/97	Steve Gladden	Growth of insect cell aggregates in suspension cultures (UG Research)	
1996/97	Stacy Cooke	Effect of High Five™ cell adaptation to suspension cultures on recombinant protein expression levels (UG Research)	Presented at the 1997 AIChE Regional Paper Contest
1996/97	Allison Miller	Effect of High Five™ cell adaptation to suspension cultures on recombinant protein expression levels (UG Research)	Presented at the 1997 AIChE Regional Paper Contest
1996/97	Michelle Hillary	Utilization of cell culture techniques for studying prostate cancer (UG Research)	
1996/97	Joshua Dormueller	Utilization of cell culture techniques for studying prostate cancer (UG Research)	
1996/97	Elizabeth Gustavsen	Utilizing recombinant DNA techniques to overcome the accumulation of few polyhedra mutants in continuous cell culture (UG Research)	Honors Project
1996/97	Jason Clarke	Synthesis of the C1 esterase inhibitor in insect cell cultures (UG Research)	
1997/98	Jennifer Mich	Synthesis of the C1 esterase inhibitor in insect cell cultures (UG Research)	
1997/98	Kurt Schlawin	Extending the life span of virally-infected insect cells (UG Research)	Presented at the 1998 AIChE Regional Paper Contest
1998/99	Jamisue Mooers	Investigating oxidative stress in virally-infected insect cells	Presented at the 1999 AIChE Regional Paper Contest
1998/99	Laura Itle	Overcoming oxidative stress in cell culture through media supplementation	Presented at the 1999 AIChE Regional Paper Contest
1998/99	Katie Busch	Investigating the effect of	Presented at the 1999

		large-scale bioreactor environments on protein glycosylation	AIChE Regional Paper Contest
1998/99	Jennifer Mich	Investigating the effect of simulated microgravity on oxidative stress	
1998/99	Gerald Phipps	Developing purification schemes for recombinant secreted alkaline phosphatase	
1999/00	Laura Itle	Investigating the effect of large scale bioreactor environments on protein glycosylation	AIChE Regional Paper Contest (4 th Place)
1999/00	David Williams	Extending the glycosylation capabilities of insect cells	AIChE Regional Paper Contest
1999/00	Katie Busch	Extending the glycosylation capabilities of insect cells	
2000/01	Laura Itle	Investigating the effect of large scale bioreactor environments on protein glycosylation	AIChE Regional Paper Contest
2002/03	Afton Thumser	Investigating the effect of baculovirus infection on the intracellular pH of insect cells	AIChE Regional Paper Contest
2002/03	Rebecca Turner	Isolating mitochondria-free insect cell lines	AIChE Regional Paper Contest
2003/04	Afton Thumser	Investigating the effect of baculovirus infection on the intracellular pH of insect cells	National AIChE Poster Presentation (2 nd Place); AIChE Regional Paper Contest
2003/04	Rebecca Turner	Isolating mitochondria-free insect cell lines	National AIChE Poster Presentation; AIChE Regional Paper Contest
2004/05	Afton Thumser	Investigating the effect of baculovirus infection on the intracellular pH of insect cells	AIChE Regional Paper Contest, 2 nd Place
2004/05	Rebecca Turner	Isolating mitochondria-free insect cell lines	AIChE Regional Paper Contest
2004/05	Katie Doherty	Isolating mitochondria-free	

(Fall only)		insect cell lines	
2004/05	Ryan Daly	Setup of bioreactor monitoring and control system	
2005/06 (Fall only)	Afton Thumser	Investigating the effect of baculovirus infection on the intracellular pH of insect cells	National AIChE Poster Presentation, 3 rd Place
2005/06	Katie Doherty	Isolation and characterization of mitochondria-free insect cell lines	AIChE Regional Paper Contest 2 nd Place
2005/06	Ryan Daly	Setup of bioreactor monitoring and control system	
2005/06	Tyler Kleene	Isolating new cell lines from insect eggs and larvae	AIChE Regional Paper Contest 3 rd Place
2006/07 (Fall Only)	Katie Doherty	Isolation and characterization of mitochondria-free insect cell lines	National AIChE Paper Contest
2006/07 (Spring only)	Anne-Marie Marquez	Isolation and characterization of mitochondria-free insect cell lines	
2007/08	Anne-Marie Marquez	Evaluating the contribution of mitochondria to the oxidative stress occurring in baculovirus-infected insect cells	
2007/08	Nichole Daringer	Evaluating the contribution of the CuZnSOD homolog in the baculovirus genome	
2007/08	Albert Kang	Setting up bioreactor control system and investigating the effect of CO ₂ accumulation on insect cell culture	
2007/08 (Spring only)	Aaron Irons	Evaluating baculovirus mutations in continuous cultures	
2008/09	Anne-Marie Marquez	Evaluating the contribution of mitochondria to the oxidative stress occurring in baculovirus-infected insect cells	
2008/09	Aaron Irons	Evaluating baculovirus	AIChE Regional

		mutations in continuous cultures	Paper Contest
2009/10	Aaron Irons	Evaluating baculovirus mutations in continuous cultures	
5.3b	<u>Other Student Mentoring and Special Advising (Incomplete List)</u>		
<u>Sem</u>	<u>Student</u>	<u>Description</u>	
Sp 1991	Jennifer Doran	Pre-teaching internship for Process Calculations (52:041)	
Su 1991	Ritu Bhatnager	Secondary student training program (research)	
Su 1991	Jonathan Barry	Secondary student training program (research)	
Fa 1991	Lara Thorius	Design project for SWE technical writing competition (1992 regional winner and 2nd in national competition "The production of human monoclonal antibodies")	
Sp 1992	Gloria Jennings	Pre-teaching internship for Process Calculations (52:041)	
Sp 1992	Tau Beta Pi students	Assisted in organizing the annual symposium ("Genetic Engineering: Cures From Within")	
Sp 1992	AIChE Student Chapter group	Assisted in organizing 1992 Mid-America Regional AIChE Student Paper Contest held at UI	
Su 1992	Steven Tomkins	Secondary student training program (research)	
1992	Martin Rhiel	Professional internship for German Biotechnology Degree	
Su 1993	David Beuther	REU researcher	
1993/94	Michael Wolff	Professional internship for German Biotechnology Degree	
Su 1994	Barbara Griffith	REU researcher	
Su 1994	Heather Carlson	REU researcher	
Sp 1995	Ken Kauffman	Pre-teaching internship for Momentum Transport (52:042)	
Sp 1995	Cathy Gaffney	Iowa City High Research Program	
Su 1995	Rebekah Sawaya	REU researcher	
Su 1995	Stephanie Isaacson	REU researcher	
Fa 1995	Jonathan Carter	Pre-teaching internship for Process Calculations (52:041)	
Fa 1995	Dianne Bulechek	Iowa City High Research Program	
Su 1996	Melanie Seader	REU researcher	
Su 1996	Jamie Huynh	REU researcher	
Su 1997	John Andrew McKay	REU researcher	
Su 1997	Ana Catalina Flores	REU researcher	
Sp 1998	James Davoux	UG TA for Momentum Transport (52:042)	
Sp 1998	Stacy Cooke	UG TA for Process Safety (52:087)	
Sp 1998	Jennifer Foelske	UG TA for Process Safety (52:087)	
Fa 1997	Bettina Buchel	Professional internship for German Biotechnology Degree	
1998/99	Frank Kogelberg	Professional internship for German Biotechnology Degree	
1998/99	Jamisue Mooers	UG TA for Process Safety (52:187)	
1998/99	Brian Dorathy	UG TA for Process Safety (52:187)	
Sp 1999	Rebecca Rose	UG TA for Momentum Transport (52:042)	
Sp 2000	Jennifer Mich	UG TA for Process Safety (52:187)	
Sp 2000	Matthew Warren	UG TA for Process Safety (52:187)	
Sp 2001	Danielle Hillary	UG TA for Momentum Transport (52:042)	
Sp 2001	Laura Itle	UG TA for Process Safety (52:187)	
Sp 2001	Abby Anderegg	UG TA for Process Safety (52:187)	
Sp 2002	Melissa Nippert	UG TA for Process Safety (52:187)	

Sp 2002	Bryce Nielsen	UG TA for Process Safety (52:187)
Sp 2003	John Elliff	UG TA for Process Safety (52:187)
Sp 2003	Theresa Heckenlively	UG TA for Process Safety (52:187)
Sp 2004	Tracey Irwin	UG TA for Process Safety (52:187)
Sp 2004	Erica Scheckel	UG TA for Process Safety (52:187)
Fa 2004	Valerie Perrin	UG TA for Process Calculations (52:041)
Sp 2006	Alexandra Olson	UG TA for Process Safety (52:187)
Sp 2006	Tyler Kleene	UG TA for Process Safety (52:187)
Sp 2007	William Wortman	UG TA for Process Safety (52:187)
Sp 2007	William Lietchy	UG TA for Process Safety (52:187)
Fa 2007	James Wydra	UG TA for Intro to Biochem Engr (52:108)
Sp 2008	Ryan Whitaker	UG TA for Engr Flow & Heat (52:151)
Fa 2008	Jimmy Glenn	Graduate Student Teaching Intern for 52:151
Sp 2009	Karen Hamen	UG TA for Process Safety (52:187)
Sp 2009	Samantha Watkins	UG TA for Process Safety (52:187)
Fa 2009	Zach Rodenburg	UG TA for Proc. Design I (52:184)
Sp 2010	Amy Althoff	UG TA for Process Safety (52:187)
Sp 2010	Jamie Cecil	UG TA for Process Safety (52:187)
Fa 2010	Collette Blake	UG TA for Proc. Design I (52:184)
Sp 2011	Scott White	UG TA for Process Safety (52:187)
Sp 2011	Amber Johnson	UG TA for Process Safety (52:187)
Fa 2011	Ben Behrendt	UG TA for Proc. Design I (52:184)
Sp 2012	Jameson Schoenfelder	UG TA for Process Safety (52:187)
Sp 2012	Derek Baerenwald	UG TA for Process Safety (52:187)
Fa 2012	Samantha Westerhof	UG TA for Proc. Design I (52:184)
Sp 2013	Scott Shields	UG TA for Process Safety (52:187)
Sp 2013	Darren Youngs	UG TA for Process Safety (52:187)
Sp 2013	Matt Gosse	UG TA for Process Safety (52:187)

5.3c Undergraduate Student Advising (Incomplete List)

Sem	Number of Advisees
-----	--------------------

Sp 2000	~20
Fa 2000	~15
Sp 2001	~15
Fa 2001	~15
Sp 2002	~15
Fa 2002	~15
Sp 2003	~15
Fa 2003	~15
Sp 2004	~15
Fa 2004	~15
Sp 2005	~15
Fa 2005	~15
Sp 2006	~20
Fa 2007	~20
Sp 2007	23
Fa 2007	34
Sp 2008	34
Fa 2008	22
Sp 2009	22

Fa 2009	21
Sp 2010	21
Fa 2010	~20
Sp 2011	~20
Fa 2011	~20
Sp 2012	~20
Fa 2012	~20
Sp 2013	~20

5.4 Supervision of Postdoctoral Associates

<u>Sem</u>	<u>Name</u>	<u>Project Description</u>	<u>Next Position After Leaving Group</u>
1995-97	Mark Riley	Monitoring insect cell bioreactors with near-infrared spectroscopy	Univ. of Ariz. Biol. Engr. Dept. (4/1/97 start date)
1999-2001	Fuming Zhang	Investigating the effect of large-scale bioreactor environments on protein glycosylation	Research Prof. At RPI
2000-2002	Jiang Qiu	Monitoring insect cell bioreactors with near-infrared spectroscopy	Grad. student in Pharmacy

5.5 Seminars and Short Courses

<u>Date</u>	<u>Location</u>	<u>Host Org.</u>	<u>Title/Description</u>
-------------	-----------------	------------------	--------------------------

5.6 Advisor to Student Groups

<u>Sem</u>	<u>Group</u>	<u>Description</u>
Sp 1990	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1990	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 1991	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1991	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 1992	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1992	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 1993	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1993	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1993	Freshmen Seminar	Introductory Seminar for ChE majors
Sp 1994	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 1994	Freshmen Seminar	Introductory Seminar for ChE majors
Fa 1994	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 1995	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1995	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 1996	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1996	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 1998	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 1999	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 2000	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 2000	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 2001	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Fa 2001	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar
Sp 2002	AICHe Student Chapter	AICHe Student Chapter/Professional Seminar

Fa 2002	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2003	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2003	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2004	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2004	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2005	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2005	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2006	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2006	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2007	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2007	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2008	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2008	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2009	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2009	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2010	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2010	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2011	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2011	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2012	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2012	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2013	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2013	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2014	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2014	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2015	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2015	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2016	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Fa 2016	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar
Sp 2017	AIChE Student Chapter	AIChE Student Chapter/Professional Seminar

5.7 Teaching Awards and Nominations

<u>Date</u>	<u>Title</u>	<u>Grantor</u>	<u>Selection Process</u>	<u>Nominee</u>
1991	Tau Beta Pi Teaching Award	Tau Beta Pi	Nominated by Students	Nomination
1992/93	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee	
1993/94	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee	
1994	Outstanding AIChE Student Chapter Advisor Award	AIChE	Nominated by Department	Nomination
1994/95	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee	
1995	Outstanding AIChE Student Chapter Advisor Award	AIChE	Nominated by Department	Nomination
1995/96	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee	
1996	Outstanding AIChE	AIChE	Nominated by	

	Student Chapter Advisor Award		Students
1996/97	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
1997/98	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
1998/99	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
1999/00	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2000/01	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2001	College of Engineering Outstanding Teaching Award	UI	Nominated by Dept./ Selected by UI Committee
2001/02	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2002/03	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2004/05	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2005/06	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2006/07	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2007/08	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2008/09	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2009/10	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2010/11	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2011/12	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2011	Excellence in Teaching And Dedication to Student Success	COE	Fall 2011 Graduating Seniors
2012/13	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2013/14	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2014/15	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee
2015/16	AIChE Outstanding Student Chapter Award	AIChE	Selected by Special Committee

5.8 Formative Evaluations

Get feedback (anonymous written comments) from the students throughout the course in order to insure that the students are grasping the material and to use as a guide for better presentation of material.

Provide and emphasize alternatives/additions to exams in which students can do well, e.g., projects.

Increase active student participation in lectures by asking directed questions, etc.

Emphasize practical problem solving and teamwork by assigning group projects.

5.9 Textbooks and Educational Publications

<u>Date</u>	<u>Description</u>
-------------	--------------------

5.10 Funded and Unfunded Course, Curriculum, Software, and Laboratory Development

5.10a Introduction of new course in conjunction with departmental goals

Bioseparations (52:181) (w/ Profs Carmichael, Dordick, Rodgers) (Summer 1990)

Advanced Thermodynamics (52:117) (with Prof. Victor Rodgers) (Summer 1991)

Engineering Aspects of Animal Cell Culture (52:280) (Spring 1992)

Freshman Seminar (52:090) (1993/94)

Chemical Process Safety (52:187) (Spring 1996)

First-Year Seminar: The Energy Future (52:029) (with Alec Scranton) (Spring 2006)

Energy and Society (52:030) (with Alec Scranton) (Fall 2008)

Chemical Process Safety Laboratory (development over many years, ~1998 & 2008-2013)

Chemical Engineering Process Design I (52:184) (Fall 2009)

5.10b Introduction of innovative teaching methods

Introduced BioPro Designer to students in Introduction to Biochemical Engineering and assigned a design project utilizing this software (Fall 1993).

Developed oral presentation evaluation forms for Unit Operation Laboratory presentations to give constructive feedback to students (Fall 1992).

Modified Unit Operations Laboratory to emphasize open-ended problem solving (Fall 1992).

5.10c Development of laboratories for teaching purposes

Engineering Biological Science (57:013), Fall 1990

Engineering Biological Science (57:013), Fall 1991

Unit Operations Laboratory I (52:047), Fall 1992

Unit Operations Laboratory I (52:047), Fall 1993

Momentum Transport (52:042), Fall 1994 and Spring 1995

National Science Foundation (Instrumentation and Laboratory Improvement) grant (\$37,427)

to equip a process safety laboratory to supplement the Process Safety Course (52:087),

Spring 1997, Spring 1998, and Spring 1999 [Funds also obtained from industrial sources].

5.10d Introduction of computer technology into courses

Process Calculations (52:041), Spring 1992

Intro Biochem Engr (52:108), Fall 1993

Process Calculations (52:041), Fall 1995

5.10e Participation in teaching related committees

Engineering Teaching Committee Member, Fall 1992

5.10f Participation in curriculum development

Involved in modifying chemical engineering curriculum, 1990-present

COE Curriculum Committee Member, Spring 1993

Chemical Engineering Curriculum Reengineering Committee (Chair, 1997-2002), 1997-

present
COE Curriculum Committee Member, 2001-2004

5.11 Other

Attended ASEE summer school for chemical engineering faculty (Boseman, MT), August 1992

Participated in a corporate visit to Cargill, Inc. in reference to the recruitment of University of Iowa Chemical Engineering graduates, Summer 1994

Attended SACHE (Safety and Chemical Engineering Education) Faculty Workshop regarding the "Characterization and Control of Chemical Process Hazards" held in Wyandotte, MI in May 1997.

Attended the ASEE summer school for chemical engineering faculty (Snowbird, Utah), August 1997.

Attended ABET Faculty Workshop for Program Improvement (Baltimore, MD), Jan. 2002.

6. Research Activities

6.1 Active research fields at present

None

6.2 Principal investigator on contracts and/or grants

<u>Contract or Grant Title</u>	<u>Total Grant Funding</u>	<u>Starting and Dates of Project</u>
Hybridoma protein synthesis, including monoclonal antibody, under anoxic conditions NIH through Biomedical Research Support Grant Funds	\$10,000	11/89 - 11/90
Hybridoma protein synthesis, including monoclonal antibody, under anoxic conditions Old Gold Summer Fellowship	\$3,500	Summer 1990
Improving the fidelity of protein glycosylation in a baculovirus/ insect cell expression system NIH through Biomedical Research Support Grant Funds	\$10,000	12/90 - 12/91
Use of cell fusion techniques to improve the protein processing Capabilities of insect cells Carver Scientific Research Initiative Grant Program	\$7525	1/92 - 1/93
Research Experiences for Undergraduate Site (REU) (with Victor Rodgers) National Science Foundation	\$76,000	6/92 - 12/94
Expression of viral surface proteins for cancer diagnosis and therapy American Cancer Society	\$15,000	11/92 - 11/93

Institutional Research Seed Grant

Use of perfusion cultures to study the effect of dissolve oxygen concentration on the baculovirus/insect cell expression system	\$8175	2/93 - 7/93
Central Investment Fund for Research Development	\$166,254	8/94 - 8/97
Adaptation of insect cells to suspension growth		
National Science Foundation		
Production of viral insecticides in plug flow bioreactors	\$8000	11/94 - 11/95
corporate support from American Cyanamid		
REU Supplement for "Adaptation of Insect Cells to Suspension Growth"	\$10,000	2/95 - 2/96
National Science Foundation		
Research Experiences for Undergraduate Site (REU) (with Victor Rodgers)	\$163,763	6/95 - 6/98
National Science Foundation		
Continuous, noninvasive monitoring of rotating wall vessels and application to the study of prostate cancer (with Mark Arnold and Michael Cohen)	\$905,000	8/95 - 8/99
NASA		
Altering protein glycosylation in insect cells	\$13,000	5/95 - 5/96
Carver Scientific Research Initiative Grant Program		
Developing near-infrared spectroscopy for monitoring glucose, glutamine, and other components in insect cell bioreactors (with Mark Arnold)	\$19,500	9/95-1/96
corporate support from American Cyanamid		
REU Supplement for "Adaptation of Insect Cells to Suspension Growth"	\$10,000	2/96 - 7/97
National Science Foundation		
Development of an Undergraduate Process Safety Laboratory	\$37,427	5/96-4/98
National Science Foundation		
Developing near-infrared spectroscopy for monitoring glucose, glutamine, and other components in insect cell bioreactors	\$19,500	1/96-12/97

(with Mark Arnold) corporate support from American Cyanamid

Genetic modifications and environmental factors influencing glycoprotein processing in the baculovirus-insect cell system (with Robert Linhardt, Don Jarvis, John Weiler) National Science Foundation	\$406,610	8/98-8/01
Evaluating oxidative stress in virally-Infected cells in simulated microgravity (With Victor Rodgers, Larry Oberley) NASA	\$533,000	1/99-11/03* *includes 1 yr no-cost extension
Monitoring and control of rotating wall Vessels and application to the study Of prostate cancer [renewal] (with Mark Arnold, Michael Cohen) NASA	\$964,460	1/99-11/03* *includes 1 yr no-cost extension
Research experiences for undergraduates (REU) supplement for NSF grant	\$20,000	11/98-8/00
Overcoming few polyhedra mutant Accumulation in baculovirus production Carver Scientific Research Initiative Grant Program	\$15,000	6/2001-6/2002
Metabolic engineering: extending the Lifespan of baculovirus infected Insect cells (with Don Jarvis, Univ. Of Wyoming) NIH	\$620,081	5/2003-5/2006 (no cost extension to 8/2008)
Cost-effective production of baculovirus (with Bryony Bonning, Iowa State Univ.) EPA	\$320,000	1/2004-1/2007 (no cost extension to 1/2009)
Developing cell cultures from <i>Drosophila similans</i> tissue IREU (support for Tyler Kleene's research)	\$2,892	3/2005-7/2006
Mechanism of carbon dioxide inhibition in insect cell culture NSF	\$340,004	7/2006-6/2009 (no cost extension to 6/2011)
Research experiences for undergraduates (REU) supplement for NSF grant	\$7,000	6/2007-5/2008

6.3 Participation (5 hours/week or more) in research contracts and/or grants

6.4 Other important facts or information

6.4.1 Pending Proposals

<u>Project Title</u>	<u>Grant Amount</u>	<u>Submission Date</u>
----------------------	---------------------	------------------------

6.4.2	<u>Potential Proposals to be submitted in the future (as time permits):</u>		
	<u>Project Title</u>	<u>Grant Amount</u>	<u>Submission Date</u>
	The role of mitochondria and oxidative stress in the baculovirus infection process		
	The role of the CuZnSOD homolog in the baculovirus Infection process		
	Overcoming few polyhedra mutant accumulation during the passaging of baculovirus in insect cell culture		
	The use of phage to treat bacterial infections		
	Chemical process safety related		

7. Publications

7.1 Books and monographs

Baculovirus and Insect Cell Expression Protocols, 2nd ed., Humana Press, Editor, 2007.

Baculovirus and Insect Cell Expression Protocols, 3rd ed., Humana Press, Editor, 2016.

7.2 Articles in technical journals with rigorous review procedures

Decius, J.C.; Murhammer, D.W., "Absolute i.r. intensities, dipole derivatives and vibrational charge parameters in the perchlorate anion", *Spectrochimica Acta*, Vol. 36A, 1980, pp. 965-969.

Murhammer, D.; Davis, D.; Levenspiel, O., "Shrinking core model/reaction control for a wide size distribution of solids", *Chem. Engr. J.*, Vol. 32, 1986, pp. 87-91.

Murhammer, D.W.; Goochee, C.F., "Scaleup of insect cell cultures: protective effects of Pluronic F-68", *Bio/Technology*, Vol. 6, 1988, pp. 1411-1418.

Murhammer, D.W.; Goochee, C.F., "Structural features of nonionic polyglycol polymers responsible for the protective effect in sparged animal cell bioreactors", *Biotechnology Progress*, Vol. 6, 1990, pp. 142-148.

Murhammer, D.W.; Goochee, C.F., "Sparged animal cell bioreactors: mechanism of cell damage and Pluronic F-68 protection", *Biotechnology Progress*, Vol. 6, 1990, pp. 391-397.

Murhammer, D.W., "The use of insect cell cultures for recombinant protein synthesis: engineering aspects", *Applied Biochemistry and Biotechnology*, Vol. 31, 1991, pp. 283-310.

Murhammer, D.W.; Pfalzgraf, E.C., "Effects of Pluronic F-68 on oxygen transport in an agitated, sparged bioreactor", Biotechnology Techniques, Vol. 6, 1992, pp. 199-202.

Pasumarthy, M.K.; Murhammer, D.W., "Clonal variation in the *Spodoptera frugiperda* IPLB-SF21-AE insect cell population", Biotechnology Progress, Vol. 10, 1994, pp. 314-319.

Pasumarthy, M.K.; Murhammer, D.W., "Variation in recombinant protein expression levels among clones of lepidopteran cell populations", Enzyme and Microbial Technology, Vol. 17, 1995, pp. 168-174.

Chung, H.; Arnold, M.A.; Rhiel, M.; Murhammer, D.W., "Simultaneous measurement of glucose and glutamine in aqueous solutions by near infrared spectroscopy", Applied Biochemistry and Biotechnology, Vol. 50, 1995, pp. 109-125.

Rhiel, M.; Murhammer, D.W., "The effect of oscillating dissolved oxygen concentrations on the metabolism of a *Spodoptera frugiperda* IPLB-Sf21-AE Clonal Isolate", Biotechnology and Bioengineering, Vol. 47, 1995, pp. 640-650.

Zhou, X.; Chung, H.; Arnold, M.A.; Rhiel, M.; Murhammer, D.W., "Selective measurement of glutamine and asparagine in aqueous media by near-infrared spectroscopy" in "Recent advances in biosensors, bioprocess monitoring and bioprocess control," ACS Symposium Series, Vol. 613, 1995, pp. 116-132.

Matschiner, A.; Dordick, J.S.; Murhammer, D.W., "Isolation of virally-infected insect cells from a population containing infected and uninfected cells", Biotechnology Techniques, Vol. 9, 1995, pp. 897-900.

Murhammer, D.W., "Production of viral insecticides in cell culture and their use for pest control", Applied Biochemistry and Biotechnology, Vol. 59, 1996, pp. 199-220.

Chung, H.; Arnold, M.A.; Rhiel, M.; Murhammer, D.W., "Simultaneous measurements of glucose, glutamine, ammonia, lactate, and glutamate in aqueous solutions by near-infrared spectroscopy", Applied Spectroscopy, Vol. 50, 1996, pp. 270-276.

Riley, R.R.; Rhiel, M.; Zhou, X.; Arnold, M.A.; Murhammer, D.W., "Simultaneous measurement of glucose and glutamine in insect cell culture media by near infrared spectroscopy", Biotechnology and Bioengineering, Vol. 55, 1997, pp 11-15.

Rhiel, M.; Mitchell-Logean, C.M.; Murhammer, D.W., "Comparison of *Trichoplusia ni* BTI-Tn-5B1-4 (High Five™) and *Spodoptera frugiperda* Sf-9 insect cell line metabolism in Suspension Cultures", Biotechnology and Bioengineering, Vol. 55, 1997, pp 909-920.

Mitchell-Logean, C.M.; Murhammer, D.W., "Bcl-2 expression in Sf-9 and BTI-Tn-5B1-4 insect cells: effect on recombinant protein expression and cell viability", Biotechnology and Bioengineering, Vol. 56, 1997, 380-390.

Mitchell-Logean, C.M.; Murhammer, D.W., "Bioreactor headspace purging reduces dissolved carbon dioxide accumulation in insect cell cultures and enhances cell growth", Biotechnology Progress, Vol. 13, 1997, pp 875-877.

Riley, M.R.; Arnold, M.A.; Murhammer, D.W.; Walls, E.L.; Delacruz, N., "Adaptive calibration scheme for quantification of nutrients and byproducts in insect cell

bioreactors by near infrared spectroscopy”, Biotechnology Progress, Vol 14, 1998, pp. 527-533.

Riley, M.R.; Arnold, M.A.; Murhammer, D.W. (1998). Matrix enhanced buffer calibration procedure for multivariate calibration models with near infrared spectra. Applied Spectroscopy, **52**: 1339-1347.

Spear, S.K.; Rhiel, M.; Murhammer, D.W.; Arnold, M.A., “Ammonia measurements in mammalian cell culture media with a diffuse reflectance-based fiberoptic ammonia sensor”, Applied Biochemistry and Biotechnology, Vol. 75, 1998, pp 175-186.

Wolff, M.W.; Linhardt, R.J.; Murhammer, D.W., “Release and preparation of intact and unreduced N-linked oligosaccharides from *Spodoptera frugiperda* Sf-9 insect cells”, Preparative Biochemistry and Biotechnology, Vol. 29, 1999, pp. 1-28.

Saarinen, M.A.; Troutner, K.A.; Gladden, S.G.; Mitchell-Logean, C.M.; Murhammer, D.W., “Recombinant protein synthesis in *Trichoplusia ni* BTI-Tn-5B1-4 insect cell aggregates”, Biotechnology and Bioengineering, Vol. 63, 1999, pp. 612-617.

Wolff, M.W.; Murhammer, D.W.; Jarvis, D.L.; Linhardt, R.J., “Electrophoretic analysis of glycoprotein glycans produced by lepidopteran insect cells infected with an immediate early recombinant baculovirus encoding mammalian β 1,4-galactosyltransferase”, Glycoconjugate Journal, Vol. 16, 1999, pp. 753-756.

Riley, M.R.; Arnold, M.A.; Murhammer, D.W., “Effect of sample complexity on quantification of analytes in aqueous samples by near infrared spectroscopy”, Applied Spectroscopy, Vol 54, 2000, pp. 255-261.

Saarinen, M.A.; Murhammer, D.W., “Culture in the rotating-wall vessel affects recombinant protein production capabilities of two insect cell lines in different manners”, In Vitro Cellular & Developmental Biology – Animal, Vol. 36, 2000, pp. 362-366.

Choe, J.; Zhang, F.; Wolff, M.W.; Murhammer, D.W.; Linhardt, R.J.; Dordick, J.S., “Separation of α -acid glycoprotein glycoforms using affinity-based reverse micellar extraction and separation”, Biotechnology & Bioengineering, Vol. 70, 2000, pp. 484-490.

Dorathy, B.D.; Mooers, J.A.; Warren, M.M.; Mich, J.L.; Murhammer, D.W., “Experiments to demonstrate chemical process safety principles”, Chemical Engineering Education, Vol. 35, 2001, pp. 36-44.

Zhang, F.; Wolff, M.W.; Williams, D.; Busch, K.; Lang, S.C.; Murhammer, D.W.; Linhardt, R.J., “Affinity purification of secreted alkaline phosphatase produced by the baculovirus expression vector system”, Applied Biochemistry and Biotechnology, Vol. 90, 2001, pp. 125-136.

Wang, Y.; Oberley, L.W.; Murhammer, D.W., “Antioxidant defense systems of two lepidopteran insect cell lines”, Free Radical Biology & Medicine, Vol. 30, 2001, pp. 1254-1262.

Wolff, M.W.; Zhang, F.; Roberg, J.J.; Caldwell, E.E.O.; Kaul, P.R.; Serrahn, J.N.; Murhammer, D.W.; Linhardt, R.J.; Weiler, J.M., “Expression of C1 esterase inhibitor

by the baculovirus expression vector system: preparation, purification, and characterization”, Protein Expression and Purification, Vol. 30, 2001, pp. 414-421.

Wang, Y.; Oberley, L.W.; Murhammer, D.W., “Evidence of oxidative stress following the viral infection of two lepidopteran insect cell lines”, Free Radical Biology & Medicine, Vol. 31, 2001, pp. 1448-1455.

Rhiel, M.; Cohen, M.B.; Murhammer, D.W.; Arnold, M.A., “Nondestructive near-infrared spectroscopic measurement of multiple analytes in undiluted samples of serum-based cell culture media”, Biotechnology & Bioengineering, Vol. 77, 2002, pp. 73-82.

Zhang, F.; Saarinen, M.A.; Itle, L.J.; Lang, S.C.; Murhammer, D.W.; Linhardt, R.J., “The effect of dissolved oxygen (DO) concentration on the glycosylation of recombinant protein produced by the insect cell-baculovirus expression system”, Biotechnology & Bioengineering, Vol. 77, 2002, pp. 219-224.

Zhang, F.; Murhammer, D. W.; Linhardt, R. J., “Enzyme kinetics and glycan structural characterization of secreted alkaline phosphatase prepared using the baculovirus expression vector system”, Applied Biochemistry and Biotechnology, Vol. 101, 2002, pp. 197-210.

Saarinen, M.A.; Murhammer, D.W., “The response of virally infected insect cells to dissolved oxygen concentration: recombinant protein production and oxidative damage”, Biotechnology & Bioengineering, Vol. 81, 2003, pp. 106-114.

Winkenwerder, J.J.; Murhammer, D.W.; Reece, J.S.; Palechek, P.L.; Saarinen, M.A.; Arnold, M.A.; Cohen, M.B., “Evaluating prostate cancer cell culturing methods: a comparison of cell morphologies and metabolic activity”, Oncology Reports, Vol. 10, 2003, pp. 783-789.

Saarinen, M.A.; Reece, J.S.; Arnold, M.A.; Murhammer, D.W., “Monitoring and controlling the dissolved oxygen (DO) concentration within the high aspect ratio vessel (HARV)”, Biotechnology Progress, Vol. 19, 2003, pp. 1335-1341.

Rhiel, M.H.; Cohen, M.B.; Arnold, M.A.; Murhammer, D.W., “On-line monitoring of human prostate cancer cells in a perfusion rotating wall vessel by near-infrared spectroscopy”, Biotechnology and Bioengineering, Vol. 86, 2004, pp. 852-861.

Arnold, M.A.; Small, G.W.; Xiang, D.; Qui, J.; Murhammer, D.W., “Pure component selectivity analysis of multivariate calibration models from near infrared spectra”, Analytical Chemistry, Vol. 76, 2004, pp. 2583-2590.

Wang, Y.; Oberley, L.W.; Howe, D.; Jarvis, D.L.; Chauhan, G.; Murhammer, D.W., “The effect of manganese superoxide dismutase expression in baculovirus infected insect cells”, Applied Biochemistry and Biotechnology, Vol. 119, 2004, pp. 181-193.

Zhang, F.; Bries, A.D.; Lang, S.C.; Wang, Q.; Murhammer, D.W.; Weiler, J.M.; Linhardt, R.J., “Metabolic alteration of the N-glycan structure of a protein from patients with a heterozygous protein deficiency”, Biochimica et Biophysica Acta, Vol. 1739, 2004, pp. 43-49.

Giri, L.; Li, H.; Sandgren, D.; Feiss, M.; Roller, R.; Bonning, B.C.; Murhammer, D.W., "Removal of transposon target sites from the AcMNPV *fp25k* gene delays, but does not prevent, accumulation of the few polyhedra phenotype", Journal of General Virology, Vol. 91, 2010, pp. 3053-3064.

Giri, L.; Feiss, M.G.; Bonning, B.C.; Murhammer, D.W., "Production of baculovirus defective interfering particles during serial passage is delayed by removing transposon target sites in *fp25k*", Journal of General Virology, Vol. 93, 2012, pp. 389-399.

Qiu, J.; Arnold, M.A.; Murhammer, D.W., "On-line near infrared bioreactor monitoring of cell density and concentrations of glucose and lactate during insect cell cultivation", Journal of Biotechnology, 2014, pp. 106-111.

Vajjala, S.G; Murhammer, D.W., "Effect of CO₂ on uninfected Sf-9 cell growth and metabolism", Biotechnology Progress, Vol. 32, 2016, pp. 465-469.

7.3 Conference presentation abstracts

D. W. Murhammer

Critical Literature Review of the Kinetics of Zircon-Sand Chlorination and Related Reactions.

Pacific Northwest Metals and Minerals Conference, 1984, Portland, OR.

D.W. Murhammer and C.F. Goochee

The Scaleup of Insect Cell Cultures.

194th ACS National Meeting, 1987, New Orleans, LA.

D.W. Murhammer and C.F. Goochee

The Protective Effect of Nonionic Polyglycol Polymers in Sparged Animal Cell Bioreactors.

80th AIChE Annual Meeting, 1988, Washington, D.C.

D.W. Murhammer and C.F. Goochee

Cell Growth and Product Formation of an Insect Cell/Virus Expression System in Sparged Environments.

196th ACS National Meeting, 1988, Los Angeles, CA.

D.W. Murhammer, C.A. Passini, and C. F. Goochee

Bubble Damage in Sparged Bioreactors: the Protective Effect of Pluronic Polyols.

Engineering Foundation Conference: Cell Culture Engineering II, 1989, Santa Barbara, CA

D.W. Murhammer and C.F. Goochee

Mechanism of the Protective Effect of Nonionic Polyglycol Polymers in Sparged Animal Cell Bioreactors: Chemical and Physical Considerations.

81st AIChE Annual Meeting, 1989, San Francisco, CA

D.W. Murhammer and C.F. Goochee

The Protection of Animal Cells from the Adverse Effects of Bubble Incorporation Via Either Cavitation or Vortexing.

82nd AIChE Annual Meeting, 1990, Chicago, IL

D.W. Murhammer

Improved Protein Synthesis Using Insect Cell Culture.

Midwest Biotechnology Symposium, 1990, Saint Paul, MN

D.W. Murhammer, M.K. Pasumarthy, and C.M. Mitchell
The Use of Insect Cells Cultures for Recombinant Protein Synthesis: Engineering Aspects.
Second Pan American Chemical Congress, 1991, San Juan, Puerto Rico.

M.K. Pasumarthy and D.W. Murhammer
Selection of Cell Lines for Producing Recombinant Glycoproteins in Insect Cells.
Spring National ACS Meeting, 1992, San Francisco, CA.

C.M. Mitchell-Logean and D.W. Murhammer
Production of Fibronectin and Actin by Insect Cells Under Shear Stress and the Effect of
Different Media on Their Attachment.
Spring National ACS Meeting, 1992, San Francisco, CA.

M.K. Pasumarthy and D.W. Murhammer
Clonal variations of cellular properties within the *Spodoptera frugiperda* IPLB-Sf-
21AE insect cell population.
Spring National ACS Meeting, 1993, Denver, CO.

D.W. Murhammer
Engineering aspects of insect cell culture
ASM meeting, Atlanta, GA, 1993

M.K. Pasumarthy and D.W. Murhammer
Clonal variations of cellular properties within the *Spodoptera frugiperda* SF-21AE
insect cell population.
Fall National AIChE Meeting, 1993, St. Louis, MO

C.M. Mitchell-Logean and D.W. Murhammer
Development of an inducible baculovirus expression system for the study of transient
protein glycosylation phenomena in insect cell cultures.
Fall National AIChE Meeting, 1993, St. Louis, MO

C.M. Mitchell-Logean and D.W. Murhammer
Investigation of Virally-Infected Insect Cell Death
Fall National AIChE Meeting, 1994, San Francisco, CA

H. Chung, M. Rhiel, D. W. Murhammer, and M. A. Arnold
Simultaneous measurement of important cell culture nutrients and waste products by
NIR spectroscopy
Pittcon '95, 1995, New Orleans, LA

C.M. Mitchell-Logean and D.W. Murhammer
Cell breakdown and death of virally-infect insect cells
Baculovirus and insect cell gene expression conference, 1995, Pinehurst, NC

M. Rhiel, H. Chung, X. Zhou, M. A. Arnold, and D. W. Murhammer
Determination of 18 amino acids in aqueous solution by near infrared spectroscopy
107th Annual Meeting, Iowa Academy of Sciences, 1995, Waverly, Iowa

X. Zhou, M. A. Arnold, M. Rhiel, D. W. Murhammer
Simultaneous measurement of asparagine and glutamine in aqueous solutions by near
infrared spectroscopy
209th ACS National Meeting, 1995, Anaheim, CA

- M. Rhiel, C. M. Mitchell-Logean and D. W. Murhammer
Productivity of the Trichoplusia ni BTI Tn-5B1-4 (High Five™) Insect Cell Line in Suspension Cultures
Fall National AIChE Meeting, 1995, Miami, FL
- X. Zhou, H. Chung, M. A. Arnold, M. Rhiel, and D. W. Murhammer
Feasibility of on-line bioreactor monitoring by near infrared spectroscopy
Federation of Analytical Chemistry and Spectroscopy Societies, 1995, Cincinnati, OH
- M. R. Riley, M. A. Arnold, and D. W. Murhammer
Non-invasive measurement of glucose concentrations by near infrared spectroscopy
Biomedical Engineering Society, Fall Meeting, 1996, State College, PA
- M. R. Riley, M. Rhiel, M. A. Arnold, and D. W. Murhammer
Monitoring metabolite concentrations in insect and mammalian cell bioreactors by NIR spectroscopy
Fall National AIChE Meeting, 1996, Chicago, IL
- M. Rhiel, M. R. Riley, X. Zhou, M. A. Arnold, and D. W. Murhammer
Sensitivity and selectivity of near-infrared spectroscopy methods for process monitoring
Fall National AIChE Meeting, 1996, Chicago, IL
- M. Rhiel, P. Palechek, H. Chuang, S. Spear, M. A. Arnold, M. B. Cohen, and D. W. Murhammer
Comparison of metabolism and morphology of prostate cancer cells cultivated in tissue culture flasks and rotating wall vessel bioreactors
Fall National AIChE Meeting, 1996, Chicago, IL
- M. W. Wolff, Y. Park, E. F. Finn, R. J. Linhardt, and D. W. Murhammer
Determining glycan structures produced in insect cells
Fall National AIChE Meeting, 1996, Chicago, IL
- J. M. Weiler, J. J. Roberg, J. M. Clarke, C. Mitchell-Logean, D. W. Murhammer, J. N. Serrahn, G. R. Hanson, and E. E. O. Caldwell
Characterization of C1 inhibitor expressed by the baculovirus expression vector system
American Association of Immunologists, 1997, San Francisco, CA
- D. W. Murhammer, M. R. Riley, M. Rhiel, M. A. Arnold, E. L. Walls, and N. DelaCruz
Simultaneous monitoring of multiple cellular metabolites in bioreactors by near infrared spectroscopy
1997 ACS National Meeting, 1997, San Francisco, CA
- M. Rhiel, M. Riley, M. A. Arnold, and D. W. Murhammer
Evaluation of near-infrared spectroscopy for bioreactor monitoring.
1997 ACS National Meeting, 1997, San Francisco, CA
- M. Rhiel, M. R. Riley, H. Chuang, S. Spear, P. Palechek, M. Cohen, M. Arnold, and D. Murhammer
Continuous, noninvasive monitoring of bioreactors
ACHEMA 97, 1997, Frankfurt, Germany
- M. R. Riley, D. W. Murhammer, M. A. Arnold, E. Walls, and N. DelaCruz

An adaptive calibration scheme for NIR measurements of metabolites in insect cell bioreactors

AICHE 1997 Annual Meeting, November 1997, Los Angeles, CA

M. Rhiel, M. A. Arnold, and D. W. Murhammer

On-line monitoring of mammalian cell cultures with near-infrared spectroscopy

AICHE 1997 Annual Meeting, November 1997, Los Angeles, CA

M. Rhiel, M. A. Arnold, and D. W. Murhammer

Simultaneous monitoring of glucose, glutamine, lactate, and ammonia in prostate cancer cell cultures with near-infrared spectroscopy

ANALYTICA 98, April 1998, Munich, Germany

M. W. Wolff, R. J. Linhardt, D. W. Murhammer

Preparation and characterization of N-linked glycans with the baculovirus expression vector system

Midwestern Medicinal Chemistry Meeting, 1998, Chicago

E. E. O. Caldwell, M. W. Wolff, P. Kaul, J. N. Serrahn, D. W. Murhammer, J. M. Weiler

Baculovirus expression of human complement C1 esterase inhibitor

XVIIth International Complement Workshop, 1998, Rhodes, Greece

M. A. Saarinen, D. W. Murhammer

Insect cell metabolism in rotating wall vessels and shaker flasks – a comparison

Institute of Biological Engineering Annual Meeting, 1998, Orlando, FL

D. W. Murhammer, L. W. Oberley, C. J. Darby, K. L. Schlawin, J. A. Mooers

Evaluating and counteracting oxidative stresses in virally-infected insect cells

AICHE Annual Meeting, 1998, Miami, FL

M. W. Wolff, R. J. Linhardt, D. W. Murhammer, J. L. Jarvis

Addition of galactosyltransferase to the insect cell N-glycosylation pathway

AICHE Annual Meeting, 1998, Miami, FL

L. W. Oberley, M. A. Saarinen, Y. Wang, D. W. Murhammer.

Oxidative stress in virally infected insect cells.

AICHE Annual Meeting, 1999, Dallas, TX.

R. J. Linhardt, M. W. Wolff, F. Zhang, D. W. Murhammer

Modifying N-linked protein glycosylation in the *Spodoptera frugiperda* Sf-9 insect cell line.

AICHE Annual Meeting, 1999, Dallas, TX.

D. W. Murhammer, Y. Wang, L. W. Oberley, D. L. Jarvis

Evaluating and counteracting oxidative stresses in virally infected insect cells

ACS National Meeting, 2000, San Francisco, CA

M. A. Saarinen, Y. Wang, D. L. Jarvis, L. W. Oberley, D. W. Murhammer

Evaluating the role of oxidative stresses in virally infected insect cells.

AICHE Annual Meeting, 2000, Los Angeles, CA.

P. A. Rose, M. Feiss, D. W. Murhammer

Expression of the baculovirus 25kD protein in infected *Spodoptera frugiperda* to overcome the few polyhedra phenotype

AICHE Annual Meeting, 2001, Reno, NV

Y. Wang, M. A. Saarinen, D. W. Murhammer
Evaluating and counteracting oxidative stresses in virally-infected insect cells
AICHE Annual Meeting, 2001, Reno, NV

J. Qiu, M. A. Arnold, D. W. Murhammer
Using near-infrared spectroscopy for monitoring insect cell cultures in various bioreactors
AICHE Annual Meeting, 2001, Reno, NV

D. W. Murhammer, Y. Wang
Counteracting the adverse effects of oxidative stress in baculovirus infected insect cells
AICHE Annual Meeting, 2002, Indianapolis, IN

P. A. Rose, M. Feiss, D. W. Murhammer
Determining the role of the viral FP25kD protein in the production of occluded baculovirus
AICHE Annual Meeting, 2002, Indianapolis, IN

C. F. Ng, L. D. Chen, D. W. Murhammer, V. G. J. Rodgers
Three dimensional mass transport modeling of dissolved gases in NASA high aspect ratio rotating wall vessel
AICHE Annual Meeting, 2002, Indianapolis, IN

P. A. Rose, D. W. Murhammer
Expression of baculovirus FP25K protein at different times during viral infection impacts polyhedra production.
AICHE Annual Meeting, 2003, San Francisco, CA.

G. Chauhan, D. W. Murhammer
Determining the intracellular location of reactive oxygen species in baculovirus infected insect cells.
AICHE Annual Meeting, 2003, San Francisco, CA.

P. Rose, M. Feiss, D. Murhammer
Baculovirus FP25K protein expression at different times during viral infection impacts polyhedra production
ACS National Meeting, 2004, Anaheim

E. Bond, G. Chauhan, A. Thumser, K. Doherty, D. Murhammer
The role of oxidative stress in the baculovirus cytotoxicity of insect cells
Society for Free Radical Biology and Medicine National Meeting, 2004, St. Thomas, Virgin Islands

J. Qiu, M. Arnold, D. Murhammer
On-line simultaneous cell density, glucose and lactate monitoring of *Trichoplusia ni* BTI-Tn-5B1-4 insect cell cultures with near-infrared spectroscopy
American Association of Pharmaceutical Scientists Annual Meeting, 2005, Nashville, Tn.

E. Bond, G. Chauhan, A. Thumser, K. Doherty, D. Murhammer
Understanding oxidative stress in baculovirus-infected insect cells
Society for Free Radical Biology and Medicine Meeting, 2005, Austin, TX.

- Bond, Elena L.; Chauhan, Gaurav; Doherty, Kathleen; Turner, Rebecca; Murhammer, David W.
Investigating the Mitochondria's Role in the Oxidative Stress of Baculovirus-Infected Cells.
AIChE Annual Meeting, 2006, San Francisco, CA.
- Giri, Lopamudra; Murhammer, David W.; Bonning, Bryony; Feiss, Mike.
Towards Continuous Biopesticide Production in Insect Cell Culture: Overcoming Mutations in Fp25k Baculovirus Gene.
AIChE Annual Meeting, 2006, San Francisco, CA.
- Bond, Elena; Doherty, Kathleen; Murhammer, David.
Oxidative stress in baculovirus-infected insect cells with inactive mitochondria.
Society for Free Radical Biology and Medicine Meeting, 2006, Denver, CO.
- Giri, Lopamudra; Murhammer, David.
Construction of an insect cell line having viral gene FP25K: A potential remedy for FP mutation in large-scale baculovirus production.
SBE's 1st International Conference on Accelerating Biopharmaceutical Development, 2007, Coronado, CA.
- Giri, Lopamudra; Murhammer, David; Feiss, Michael; Bonning, Bryony.
Overcoming mutations in baculovirus FP25 gene.
Baculovirus Technology Conference, 2007, Boston, MA.
- Bond, Elena; Jarvis, Donald; Murhammer, David.
Antioxidant overexpression during baculovirus infection.
Society for Free Radical Biology and Medicine Meeting, 2007, Washington, D.C.
- Giri, Lopamudra; Murhammer, David W.; Bonning, Bryony C.; Feiss, Mike; Roller, Richard.
Removal of transposon target sites from AcMNPV *fp25k* delayed incidence of FP phenotype but had no impact on DIP production in cell culture.
41st Annual Meeting of the Society for Invertebrate Pathology and 9th International Conference on *Bacillus thuringiensis*, Virus Division, 2008, University of Warwick, Coventry, United Kingdom.
- Giri, Lopamudra.
Towards Large-Scale Continuous Baculovirus Production in Insect Cell Culture: Overcoming Mutations in fp25k Baculovirus Gene.
Baculovirus Technology, 2008, Boston.
- Bhakti Bapat, Sucheta Vajrala, and David W. Murhammer
Carbon dioxide inhibitory effect on uninfected and baculovirus-infected insect cell culture and the role of intracellular pH.
ACS National Meeting, 2011, Anaheim
- Bhakti Bapat and David Murhammer
Role of homolog CuZnSOD in baculovirus infection in insect cells.
ACS National Meeting, 2013, New Orleans

7.4 Articles published in popular journals or journals with moderate review

procedures or presented at a meeting and for which the society or organization does not provide a permanent printed version of article
None.

7.5 Other technical publications (book and paper reviews, reports, theses, and dissertations.)

Murhammer, D.W., "The scale-up of insect cell cultures: protective effects of Pluronic F-68", Ph. D. Dissertation, University of Houston, 1989.

Murhammer, D.W., "Pluronic Polyols, Cell Protection". Chapter in The Encyclopedia of Bioprocess Technology: Fermentation, Biocatalysis and Bioseparation. John Wiley & Sons. 1999 and 2007 (updated).

Murhammer, D.W., "Baculovirus and Insect Cell Expression and Protocols," editor of 2nd edition, Methods in Molecular Biology Series, Volume 388, Humana Press, 2007.

Murhammer, D.W., "Baculovirus and Insect Cell Expression and Protocols," editor of 3rd edition, Methods in Molecular Biology Series, Volume 1350, Humana Press, 2016.

7.6 Journals, publishers, and research supporting agencies for whom you have reviewed papers, books or proposals in the past three years

Biotechnology and Bioengineering

Biotechnology Progress

ACS Symposium Series

Biocatalysis and Biotransformations

Chapter from "Bioreactor Design Fundamentals" (Butterworth)

Chapter from "Baculovirus Expression Vectors" (W. H. Freeman)

Iowa State University competitive grants program for agricultural biotechnology

Louisiana Education Quality Support Fund, Research and Development Program (proposal)

"Insect Cell Culture Engineering" - entire book (Marcel Dekker, Inc.)

National Science Foundation, Instrumentation and Laboratory Improvement

National Science Foundation, Biotechnology Program

National Science Foundation, Biochemical Engineering Review Panel

BioTechniques

Journal of Biotechnology

Cytotechnology

Journal of Engineering Education

NIH Training Grants

Protein Expression and Purification

European Journal of Entomology

7.7 Invited Presentations

D.W. Murhammer

Scale-up of insect cell cultures.

Monsanto Company, St. Louis, MO, January 1990.

D.W. Murhammer

Improved Protein Synthesis Using Insect Cell Culture.

Midwest Biotechnology Symposium, 1990, Saint Paul, MN

D.W. Murhammer

The Use of insect cell cultures for recombinant protein synthesis: engineering aspects.

Department of Chemical Engineering Seminar Series, Iowa State University,
February 1992.

D.W. Murhammer
Engineering aspects of insect cell culture
ASM Meeting, Atlanta, GA, May 1993

D.W. Murhammer
Engineering aspects of insect cell cultures
Fort Dodge Laboratories, Fort Dodge, IA, February 1995.

D. W. Murhammer
Applications of the baculovirus expression systems
Northern Illinois University Biochemistry Seminar Schedule, March 1996.

D. W. Murhammer
Developing an undergraduate chemical process safety laboratory
ASEE Summer School for Chemical Engineering Faculty, Snowbird, UT, August
1997

D. W. Murhammer
Effect of bcl-2 expression on the viral infection process in insect cells
Iowa Microscopy Society Meeting, Iowa City, IA, September 1997

D. W. Murhammer
Evaluating and counteracting oxidative stresses in virally-infected insect cells.
Chemical Engineering Seminar, Notre Dame University, South Bend, IN, 2000.

D. W. Murhammer
The Energy Future
POLIS Senior Group at Quincy University, Quincy, IL, 2010.

D. W. Murhammer
Two uses of insect cell culture: producing baculovirus for biopesticide use and
investigating oxidative stress in virus infections.
Chemical Engineering Seminar, Missouri University of Science & Technology, Rolla,
MO, 2010.

D.W. Murhammer
Obstacles to Continuous Baculovirus Production.
Department of Biochemistry Research Workshop, Univ. of Iowa, September 21,
2010.

D.W. Murhammer
Obstacles to Continuous Baculovirus Production.
Chemical and Environmental Engineering Seminar, University of California –
Riverside, Riverside, CA, June 3, 2011.

D.W. Murhammer
Summary of Insect Cell Culture Research.
Novavax, Rockville, MD, January 24, 2012.