

CURRICULUM VITAE

October 2015

NAME: David Greenhill Ellis

POSITION: Professor of Physics and Astronomy

ADDRESS: Department of Physics & Astronomy Phone: 419/530-4634
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Toledo, OH 43606 dge@physics.utoledo.edu

BIRTH: Marietta, Ohio, 9 March 1936

EDUCATION:

A.B. Physics, 1958
Marietta College, Marietta, Ohio
Magna Cum Laude
Phi Beta Kappa (1957)

Ph.D. Theoretical Physics, 1964
Cornell University, Ithaca, N.Y.
Adviser: Philip Morrison
Thesis: "Neutrino Scattering at Highest Energy"

ACADEMIC POSITIONS:

Indiana University, Department of Physics
1963-65 Postdoctoral Research Associate

The University of Toledo, Department of Physics & Astronomy
1965-1970 Assistant Professor
1970-1975 Associate Professor
1975-2006 Professor
1974-1979 Department Chair
1985-1990 Department Chair
2006- Emeritus Professor

The University of Lund, Sweden, Department of Physics
1976-77 NORDITA Visiting Professor
1988 Visiting Scientist

PROFESSIONAL MEMBERSHIPS:

American Physical Society
Division of Atomic, Molecular and Optical Physics
International Section
Ohio Section

Phi Beta Kappa
Sigma Xi
Phi Kappa Phi
Sigma Pi Sigma

PUBLICATIONS OF DAVID G. ELLIS

1. Neutrino Emission by the *Urca* Process in Neutron Stars, D.G.Ellis, Phys. Rev. **139**, B754 (1965)
2. Coupled-Channel Schrödinger-Equation Model for High-Energy Peripheral Collisions, J.G.Wills, D.G.Ellis and D.B.Lichtenberg, Phys. Rev. **143**, 1375 (1966)
3. Line Strengths and Transitions Probabilities for the $2p^53s-2p^53p$ Transitions in Ne I, D.R.Shoffstall and D.G.Ellis, Jour. Opt. Soc. Am. **60**, 894 (1970)
4. Production of Weak Scalar Bosons in Lepton-Antilepton Colliding Beams, J.L.Ellis and D.G.Ellis, Phys. Letters **343**, 419 (1971)
5. Balmer-Line Emission from Auroral Protons, D.G.Ellis, R.Ptak and R.E.Stoner, Ap.J. **82**, 637 (1973)
6. Absolute Transition Probabilities for $2p^53s-2p^53p$ Transition Array in Ne I, R.M.Schectman, D.R.Shoffstall, D.G.Ellis and D.A.Chojnacki, Jour. Opt. Soc. Am. **63**, 61 (1973)
7. Density-Operator Description of Foil-Excited Atomic Beams, D.G.Ellis, Jour. Opt. Soc. Am. **63**, 1232 (1973)
8. Anisotropy in the Beam-Foil Light Source, H.G.Berry, L.J.Curtis, D.G.Ellis and R.M.Schectman, Phys. Rev. Letts. **32**, 751 (1974)
9. The Interpretation of Broad Emission Lines in High-Redshift QSOs, R.E.Stoner, R.Ptak and D.G.Ellis, Astrophys. Jour. **191**, 291 (1974)
10. Broken O4 Symmetry in Alkali-like Atoms, D.G.Ellis and J.Higginbotham, J. Phys. **B8**, 685 (1975)
11. Hyperfine Quantum Beats in Oriented N IV, H.G.Berry, L.J. Curtis, D.G.Ellis and R.M.Schectman, Phys. Rev. Lett. **35**, 274 (1975)
12. Spatial Asymmetries in Atomic Collisions, H.G.Berry, L.J. Curtis, D.G.Ellis and R.M.Schectman, *Electron and Photon Interactions with Atoms*, Kleinpoppen and McDowell, eds. (Plenum, 1976)
13. The Surface Interaction in Beam-Foil Spectroscopy, H.G.Berry, L.J.Curtis, D.G.Ellis, R.D.Hight and R.M.Schectman, *Beam-Foil Spectroscopy*, vol. 2, I. Sellin and D.Pegg, eds. (Plenum, 1976)
14. Optical Emission by Spin-Polarized Atoms, D.G.Ellis, Jour. Phys. B **10**, 2301 (1977)
15. Distortionless Optical Pulse Propagation in a Three-Level Medium, J.Higginbotham, R.T.Deck and D.G.Ellis, Phys. Rev. A **16**, 2089 (1977)
16. A Formula for Cancellation Disappearances of Atomic Oscillator Strengths, L.J.Curtis and D.G.Ellis, Jour. Phys. B **11**, L543 (1978)
17. Excitation and Decay of Bound States Near the Ionization Limit, D.G.Ellis, Jour. de Physique **40**, C1-152 (1979)
18. Comment on Tilted-Foil Excitation of Helium P Levels, D.G.Ellis, Phys. Rev. A **21**, 1061 (1980)
19. Cancellations in Transition Probabilities of the K I Isoelectronic Sequence, L.J.Curtis and D.G.Ellis, Jour. Phys. B **13**, L431 (1980)
20. Cascade Production of Power-Law Decay Curves, D.G.Ellis, Phys. Lett. A **80**, 375 (1980)

21. Alkali-like Spectra in the Promethium Isoelectronic Sequence, L.J.Curtis and D.G.Ellis, *Phys. Rev. Lett.* **45**, 2099 (1980)
22. Search for Promethium-like Gold Lines, B.M.Johnson, K.W.Jones, T.H.Kruse, L.J.Curtis and D.G.Ellis, *Nuc. Instr. Meth.* **202**, 53 (1982)
23. Closed N-Shell Alkali Spectra, D.G.Ellis and L.J.Curtis, *Nuc. Instr. Meth.* **202**, 339 (1982)
24. Double Electron Excitation and the Glauber Theory, W.Williamson, Jr., D.G.Ellis and P.S.Ramanujam, *Phys. Rev. A* **26**, 3220 (1982)
25. Configuration $1s^2 2s 3p$ in the Sequence Ne VII - Fe XXIII: Level Energies and Lifetimes, D.G.Ellis, *Phys. Rev. A* **28**, 1223 (1983)
26. The $3s 3p^3 \ ^5S$ Level in the Silicon Isoelectronic Sequence, D.G.Ellis and I.Martinson, *Physica Scripta* **30**, 255 (1984)
27. Recent Studies of Intercombination Lines in Ions, I.Martinson and D.G.Ellis, *Comments At. Mol. Phys.* **16**, 21 (1985)
28. Problems in the Calculation of Intercombination Line Strengths, D.G.Ellis, *Physica Scripta* **40**, 12 (1989)
29. Intercombination Transitions in Multiply Ionized Atoms, D.G.Ellis, I.Martinson and E.Träbert, *Comments At. Mol. Phys.* **22**, 241 (1989)
30. J-Dependent Lifetimes of Quintet Levels in Neutral Carbon, R.R.Haar, T.J.Kvale, D.G.Ellis, I.Martinson, L.J.Curtis and D.J.Beideck, *Phys. Lett. A* **141**, 131 (1989)
31. Core-Excited Lifetimes in Neutral Carbon, R.R. Haar, T.J. Kvale, D.G. Ellis, I. Martinson, L.J. Curtis and D.J. Beideck, in *Atomic Spectra and Oscillator Strengths for Astrophysics and Fusion Research*, ed. J.E. Hansen (North Holland Publ., Amsterdam, 1990) pp. 178-80.
32. Empirical Determination of Intermediate Coupling Amplitudes and Transition Rates from Spectroscopic Data, L.J.Curtis, Z.B.Rudzikas and D.G.Ellis, *Phys. Rev. A* **44**, 776 (1991)
33. Ultraviolet Transition Probabilities in N II, D.G.Ellis, *Phys. Rev. A* **47**, 161 (1993)
34. Accurate Oscillator Strengths for Interstellar Ultraviolet Lines of Cl I, R.M.Schectman, S.R.Federman, D.J.Beideck, and D.G.Ellis, *Astrophys. Jour.* **406**, 735 (1993)
35. Oscillator Strengths of Selected Resonance Transitions in Neutral Sulfur, D.Beideck, S.Federman, R.M.Schectman, and D.G.Ellis, *Astrophys. Jour.* **428**, 393 (1994)
36. Spin-induced Autoionization of Quasibound Levels in Be I, D.G.Ellis, I.Martinson, and M.Westerlind, *Physica Scripta* **49**, 561 (1994)
37. Data-based predictions of line strengths in alkali-metal-like isoelectronic sequences, L.J.Curtis, D.G.Ellis, and I.Martinson, *Phys. Rev. A* **51**, 251 (1995)
38. Measurements and data-based predictions for $\Delta n = 1$ resonance and intercombination transitions in the Be and Ne sequences, L.J.Curtis, S.T.Maniak, R.W.Ghrist, R.E.Irving, D.G.Ellis, M.Henderson, M.H.Kacher, E.Träbert, J.Granzow, P.Bengtsson, and L.Engström, *Phys. Rev. A* **51**, 4575 (1995)
39. Predictive systematization of line strengths for the $2s^2-2s 2p$ resonance and intercombination transitions in the Be isoelectronic sequence, L.J.Curtis and D.G.Ellis, *Jour. Phys. B* **29**, 645 (1996)

40. Electron correlations in multiconfiguration atomic wavefunctions, David G. Ellis, *Phys. Rev. A* **53**, 3986 (1996)
41. Lifetimes and oscillator strengths for the $6p7s\ ^3P_{0,1}$ levels in Bi II, M.Henderson, L.J.Curtis, D.G.Ellis, R.E.Irving, and G.M.Wahlgren, *Astrophys. Jour.* **473**, 565 (1996)
42. Lifetimes of the $3p^54s\ ^3P_1$, 1P_1 and $3p^53d\ ^3P_1$ levels in K II, M.Henderson, L.J.Curtis, R. Matulioniene, D.G.Ellis and Y.Li, *Phys. Rev. A* **55**, 2723 (1997)
43. Relativistic Empirical Specification of Transition Probabilities from Measured Lifetime and Energy Level Data, L.J.Curtis, D.G.Ellis, R.Matulioniene and T.Brage, *Physica Scripta* **56**, 240 (1997)
44. Lifetime Measurements in Tl III and the Determination of the Ground State Dipole Polarizabilities for Au I - Bi V, M.Henderson, L.J.Curtis, R.Matulioniene, D.G.Ellis and C.E.Theodosiou, *Phys. Rev. A* **56**, 1872 (1997)
45. Limitations on the precision of atomic meanlife measurements, L.J. Curtis, R.T. Deck and D.G. Ellis, *Phys. Lett. A* **230**, 330 (1997)
46. Lifetimes of Doubly-Excited $2p3l$ Levels in Singly Ionized B II, R.E. Irving, M. Henderson, D.G. Ellis, L.J. Curtis, Y. Zou, R. Hellborg and I. Martinson, *Physica Scripta* **57**, 630 (1998)
47. Lifetime measurements for ground term transitions in Ta II, W II, and Re II, M. Henderson, R.E. Irving, R. Matulioniene, L.J. Curtis, D.G. Ellis, G.M. Wahlgren and T. Brage, *Astrophys. Jour.* **520**, 805 (1999)
48. A Predictive Data-Based Exposition of $5s5p\ ^1\text{-}^3P_1$ Lifetimes in the Cd Isoelectronic Sequence, L.J. Curtis, R. Matulioniene, D.G. Ellis, and C. Froese Fischer, *Phys. Rev. A* **62**, 52513 (2000)
49. Use of the Einstein-Brillouin-Keller Action Quantization, Lorenzo J. Curtis and David G. Ellis, *American Journal of Physics* **72**, 1521 (2004)
50. Angular integration using symbolic state expansions, C. Froese Fischer and D. Ellis, *Lithuanian Journal of Physics* **44**, 121 (2004)
51. Probabilities as a bridge between classical and quantum mechanical treatments, L.J. Curtis and D.G. Ellis, *European Journal of Physics* **27**, 485-496 (2006)
52. Numerical implementation of the Einstein-Brillouin-Keller quantization for arbitrary potentials, A. J. Larkoski, D. G. Ellis, and L. J. Curtis, *American Journal of Physics* **74**, 572-577 (2006)
53. Interaction of symbolic states in atomic structure computations, R. Matulioniene, D. Ellis, and C. Froese Fischer, *Lithuanian Journal of Physics* **48**, 35-48 (2008)
54. Experimental and Semiempirical branching fractions of the $3s^23p^2 - 3s3p^3$ transition array in P II, J. Bancroft Brown, M.S. Brown, S. Cheng, L.J. Curtis, D.G. Ellis, S.R. Federman, and R.E. Irving, *Canadian Journal of Physics*, **89**, 413-6 (2011)
55. Lifetimes and oscillator strengths for ultraviolet transitions in singly ionized lead, N. Heidarian, R.E. Irving, A.M. Ritchey, S.R. Federman, D.G. Ellis, S. Cheng, L.J. Curtis, and W.A. Furman, *The Astrophysical Journal*, **808**, 112 (2015)

CONTRIBUTED PAPERS AND VARIOUS LECTURES

- "Quark Model of Elementary Particles", Marietta College, Marietta, Ohio, 15 March 1972; Andrews University, Berrien Springs, Michigan, 10 April 1973.
- "Streaming Proton Model for Seyfert Galaxy Nuclei and Quasars", Marietta College, 1974.
- "Time-Dependent Problems in Quantum Mechanics", Bowling Green State University, 17 October 1974.
- "Anisotropic Emission", Conference on Atomic Interactions in Gases and Solids, Sandbjerg, Denmark, 18-19 November 1976.
- "Transition Probabilities in Highly Excited States", Conference on Atomic and Molecular Transition Probabilities, Lund, Sweden, 28-29 March 1977.
- "Quasar Emission Lines", Helsinki University, Helsinki, Finland, 5 April 1977; NORDITA, Copenhagen, Denmark, 5 May 1977; Oslo University, Oslo, Norway, 13 May 1977.
- "Polarized Beam-Foil Spectra", Aarhus University, Aarhus, Denmark, 23 May 1977.
- "Transition Probabilities near Rydberg Series Limits", European Group for Atomic Spectroscopy, Krakow, Poland, 12-17 July 1977.
- "Oscillator Strengths in Rydberg Series", APS, Madison, Wisconsin, 29-30 November 1978.
- "Foil-Induced Dissociation of Fast Hydrogen Ions Studied by Quantum Beats" (R. M. Schectman and D. G. Ellis), Argonne National Laboratory, Chicago, Illinois, 20-21 August 1979.
- "Einstein and His Influence on the Humanities", Marietta College, Marietta, Ohio, 12 November 1979.
- "Approximate Wavefunctions for Alkali-like Ions", Conference on Atomic Processes in High Temperature Plasmas, Baton Rouge, Louisiana, 25-27 February 1981.
- "Closed N-Shell Alkali Spectra" (D. G. Ellis and L. J. Curtis), Sixth International Conference on Fast Ion Beam Spectroscopy, Quebec, Canada, 17-20 August 1981.
- "Intercombination Lines in the Be Sequence", APS Ohio Section, Bowling Green, 22-23 October 1982.
- "The $1s^2 2s 3p$ Configuration in the Sequence NE VII - Fe XXIII", Fourth Conference on Atomic Processes in High-Temperature Plasmas, Princeton N.J., 13-15 April 1983.
- "Calculations of the $3s 4p$ levels in the Mg sequence $Z=18-28$ ", Fifth Conference on Atomic Processes in High-Temperature Plasmas, Asilomar Calif. 25-28 February 1985.
- "Problems in the Calculation of Intercombination Line Strengths", Workshop on Frontiers in Atomic Structure and Spectroscopy, University of Lund, Sweden, 24-25 May 1988.
- "Computer-Generated Atomic Energy-level Diagrams", M. R. Flowers and D. G. Ellis, *Bull. Am. Phys. Soc.* **35**, 1217 (1990).
- "Spin-orbit Mixing Effects in VUV Spectra", Soviet-Swedish Seminar on High-Resolution VUV Spectroscopy, Lund, Sweden, 7-10 May 1990.
- "Autoionization of $2p 3p^3 P$ Levels in Be I" (D. G. Ellis and I. Martinson), American Physical Society DAMOP, Washington DC, 22-25 April 1991.

"Calculation of UV Oscillator Strengths in N II using MCHF Wavefunctions," American Physical Society DAMOP, Chicago, IL, 20-22 May 1992.

"Accurate Oscillator Strengths for Interstellar Ultraviolet Lines of Cl I," R.M.Schectman, S.R.Federman, D.J.Beideck, and D.G.Ellis, Fourth International Colloquium on Atomic Spectra and Oscillator Strengths, Gaithersburg, MD, 14-17 September 1992.

"Calculation of Intercombination Line Strengths in N III," D.G. Ellis, APS DAMOP, Reno, Nevada, 16-19 May 1993.

"Two-electron Correlation in MCHF Wavefunctions," APS DAMOP, Crystal City, April 1994.

"Mixing Nearly Degenerate States of Highly Charged Ions," APS DAMOP, Toronto, May 1995.

"Distribution of Interelectron Distances Within Atoms," R.Matulioniene and D.G.Ellis, APS Ohio Section, Dayton, 6-7 October, 1995.

"Evaluation of Electron Correlation in MCDF Calculations," K.Hole and D.G.Ellis, APS Ohio Section, Dayton, 6-7 October, 1995.

"Electron Coalescence with Intermediate Coupling," D.G.Ellis, R.Matulioniene, and K.Hole, APS DAMOP, Ann Arbor, Michigan, 15-18 May 1996.

"Spin-dependent Two-electron Correlations in Atomic Structure," David G. Ellis and Rasa Matulioniene, APS Ohio Section, Athens, 1-2 November 1996.

"Computation of Matrix Elements by Uncoupling of Multiconfiguration State Functions," David G. Ellis and Rasa Matulioniene, APS DAMOP, Washington DC, 18-21 April 1997.

"Improving Hartree-Fock Calculations by Considering Electron Correlation," Robert A. Komara and David G. Ellis, APS Ohio Section, Oxford, Ohio, 10-11 October 1997.

"Matrix Element Expansions for Atomic Structure," Rasa Matulioniene, David Ellis, and Charlotte Froese Fischer, APS DAMOP, Santa Fe, New Mexico, 27-30 May 1998.

"Oscillator Strengths for Ground Term Transitions in W II," Murray Henderson, Rasa Matulioniene, Lorenzo J. Curtis, David G. Ellis, Glenn M. Wahlgren and Tomas Brage, APS DAMOP, Santa Fe, New Mexico, 27-30 May 1998.

"Operator Expansion for Relativistic Multiconfiguration Calculations," Rasa Matulioniene, David Ellis and Charlotte Froese Fischer, APS DAMOP, Atlanta, Georgia, 20-26 March 1999.

"Spin-dependent Correlations in Atomic Structure," David Ellis and Rasa Matulioniene, APS DAMOP, Storrs, Connecticut, 14-17 June 2000.

"Multiconfiguration Dirac-Fock Calculations of the $5s^2\ ^1S_0 \rightarrow 5s5p\ ^{1,3}P_1$ Oscillator Strengths in the Cd Isoelectronic Sequence," R. Matulioniene, C. Froese Fischer, D.G. Ellis, and L.J. Curtis, APS DAMOP, Storrs, Connecticut, 14-17 June 2000.

"Coalescence in Relativistic Atomic Wavefunctions," Jonathan Gaffney and David Ellis, APS Ohio Section, Toledo, Ohio, 13-14 October 2000.

"Electron Coalescence in MCDHF Wavefunctions," David Ellis and Jonathan Gaffney, APS DAMOP, London, Ontario, 16-19 May 2001.

"Interaction of Correlated-variable with Configuration-state Basis Functions," David G. Ellis, APS DAMOP, Williamsburg, Virginia, 29 May – 1 June, 2002

GRADUATE STUDENT THESIS RESEARCH SUPERVISION

- "Emission of Mesons from Nucleons", Thomas H. Tenny, M.S., August 1969.
- "Line Strengths and Transition Probabilities in Neon", Donald R. Shoffstall, Ph.D., June 1971 (with R. M. Schectman).
- "Resonant Charge Transfer in Helium", C. Ross Stonesifer, M.S., August 1971.
- "Production and Decay of Weak Scalar Bosons", John L. Ellis, Ph.D., December 1971.
- "Broken O4 Symmetry in Alkali Atoms", Joseph Higginbotham, M.S., March 1974.
- "Physical Conditions in Seyfert Galaxy Nuclei", Edward Kimmer, Ph.D., March 1976 (with R. Ptak and R. E. Stoner).
- "Measurement of Optical Stokes Parameters", Richard Stevens, M.S., March 1976 (with R. M. Schectman).
- "Quantum Beats in Foil-Excited Hydrogen Light", Patrick Wyant, M.S., June 1976.
- "Oscillator Strengths in Rydberg Series", Glenn Stumpff, M.S., March 1980.
- "Excitation of Hydrogen by Electric Fields", John Montgomery, M.S., March 1980 (with R.T.Deck).
- "Angular Momentum Algebra for Symbolic Expansions in Atomic Structure Theory", Rasa Matulioniene, PhD, 1999.
- "Calculating the Breit Interaction in Multielectron Atoms Using MCDHF Wavefunctions", James Walker, M.S., December 2000.
- "Empirical Determination of Energy Parameters and Eigenvectors in an Isoelectronic Sequence", Steve Mielke, M.S., December 2000.
- "Enhancing Multi-Configuration Hartree-Fock Wavefunctions Considering Electron Coalescence," Mitra Shabestari, M.S., August 2002.

UNDERGRADUATE STUDENT RESEARCH SUPERVISION

- "Program for drawing atomic energy level diagrams," Matt Harrell, 1990
"Spin-orbit mixing in the carbon sequence," John Ughrin, 1991
"In search of correlation," Todd Leonhardt, 1992
"Correlation in Dirac-Fock wavefunctions," Karen Hole, 1995
"Improving Hartree-Fock Calculations," Bob Komara, 1997
"Electron Correlations studied by X-ray diffraction," Carmen Doudna, 1998
"Conditional Probability for Two-electron Multiconfiguration States," Anthony Vasko, 1999
"Relativistic Electron Coalescence using the MCDHF Method," Jonathan Gaffney, 2000
"Enhancement of Wavefunctions for Multi-Electron Atoms," Rachelle Ramer, 2002
"Improvement in Computing Atomic Energy Levels Using the MCHF Method", Matthew Frost, 2003
"Numerical implementation of Einstein-Brillouin-Keller quantization for arbitrary potentials", Andrew Larkoski, 2005
"Correlated Wavefunctions", Kyle Bednar, 2007
"Experimental and Semi-Empirical Branching Fractions of the $3s^23p^2 - 3s3p^3$ J=2 Transition Array in Ionized Phosphorous", Jeremy Bancroft-Brown, 2008 (with L.J. Curtis)
"Theoretical Calculation of Polarizabilities Using Variational Theory", Sean Maddock, 2009

MOST RECENT EXTERNAL GRANT SUPPORT

1998-2001: Research Experiences for Undergraduates, NSF PHY-9731880 (P.I.)

SERVICE ON DOCTORAL EXAMINATION COMMITTEES

At the University of Toledo:

David Miller, 1971; Donald Shoffstall, 1971; John Ellis, 1976; Gershom Foster, 1976; Edward Kimmer, 1976; Joseph Higginbotham, 1977; Michael Combi, 1979; Paul Noah, 1987; Patricia Rosenzweig, 1987; James Grigsby, 1989; Roger Haar, 1989; Chula Mapalagama, 1992; Naim Ozturk, 1993; Doug Furton, 1993; Janos Zsargo, 2000; Rick Andaloro, 2003; Yu-Sheng Chen, 2003; Boncho Bonev, 2005; Uma Vijh, 2005; David Horne, 2007; Adam Ritchey, 2009; Marco Nardone, 2010; Mark Simon, 2011

Elsewhere:

Robert Brooks, University of Alberta (Canada), 1979
Tomas Brage, University of Lund (Sweden), 1988
Roger Hutton, University of Lund (Sweden), 1988

COURSES TAUGHT AT THE UNIVERSITY OF TOLEDO

Undergraduate Courses

105	The World of the Atom
133	Albert Einstein: His Life, Work and Continuing Influence
175-6	Selected Topics in Physics (for students of pharmacy)
191	Introduction to Physics
207-8-9	General Physics (Recitation Sections)
210	Physics with Calculus
211	Natural Science
213-4-5	Physics for Science & Engineering Majors (Recitations)
214	Electricity and Magnetism (Lecture)
215	Thermodynamics, Waves and Optics (Lecture)
307	Atomic Physics for Engineers
321	Modern Physics
323	Nuclear Physics
384	Electronics Laboratory
431-2-3	Electricity and Magnetism (Intermediate Level)
441	Introduction to Quantum Mechanics
482	Modern Physics Laboratory
2100	Physics with Calculus
2130-40	Physics for Students of Science and Engineering
3510	Methods of Theoretical Physics
4980	Math Methods in Physics

Graduate Courses

622	Classical Mechanics
631-2	Classical Electrodynamics
633	Relativity
642-3-4	Quantum Mechanics
671-2	Atomic Physics
683	Stellar Interiors and Evolution
763	Elementary Particles
800	Applications of Group Theory to Atomic Physics
834-5-6	General Relativity, Cosmology
6140	Fundamentals of Modern Physics
6250-60	Classical Electrodynamics
6320-30	Quantum Mechanics

SPECIAL TOPICS AND NEW COURSE DEVELOPMENT

Use of planetarium as teaching aid in elementary astronomy, 1965-66.

Elementary particles for nonscience majors, Physics 121, 1966.

Stellar evolution for nonscience majors, Physics 122, 1967.

Developed Nat. Sci. 211, for the Integrated Program, with C. G. Montgomery, 1968-9.

Helped develop advanced laboratory courses, Physics 384, 482, 1970-71.

Applications of Group Theory to Atomic Physics, 1972-73.

Atomic Physics 671-672 (with R. M. Schectman and W. Williamson, Jr.) 1973-74.
Updated 834-36 General Relativity and Cosmology, 1977-78.
Helped develop new physics sequence 175-6 for pharmacy students, 1979-80.
Developed new general education course 133: "Albert Einstein: His Life, Work and Continuing Influence." Introduces the ideas of special and general relativity, related historical and philosophical issues, and current astronomical applications (1982).
Added nonlinear systems, stability theory and chaos to Classical Mechanics 622 (1988).
Developed new course 191, describing current research fields and career opportunities in physics and astronomy, for freshmen considering a major in physics. (1992)
Developed new course 105, The World of the Atom, for non-science majors. (1995)
Developed new course 210, "Physics with Calculus", to teach calculus-based problem-solving techniques to students completing the non-calculus general physics course. (1996)
Helped develop two new majors, B.A. in Physics and B.A. in Astronomy (1999-2001)
Helped develop new course 3150, to strengthen math preparation for physics courses (2006-7)

OTHER ACADEMIC ACTIVITIES

Physics & Astronomy Department Chairman, 1974-79, 1985-1990.
Coordinator for Ritter Observatory dedication ceremonies, October 1967.
Co-founder, Toledo Chapters, student organizations SPS and Sigma Pi Sigma, 1969.
Arts & Sciences Council: Charter Member, 1969-76; Executive Committee Member, 1973-74.
College Committee for Program Evaluation Criteria, 1972-73.
Chairmen's Committee on the College Honors Program, 1974-79.
University Faculty Research Committee, 1975, 1977, 1978, 1982.
Graduate Council Curriculum Committee, 1977-78.
University Fellowships and Assistantships Committee, 1978-84.
Member, Graduate Dean Search Committee, 1978-79.
First Chairman, University Computer Services Advisory Committee, 1978-79; Member, 1978-84.
Chairman, Search Committee for Director of University Computer Services, 1979-80.
Arrangements Chairman, Meeting of APS Ohio Section, April 1980.
Member, College Advisory Committee on Academic Personnel, 1981-82.
Acting Chairman, Department of Physics & Astronomy, 1984-85.
Member, Dean's committee to restructure the Honors Program, 1988-89.
Member, Search Committee for Honors Director, 1988-89.
Member, University Committee for Computer Networking, 1989-91.
Campus Representative, Goldwater Scholarship Program for science students, 1990-95.
Member, Selection Committee, Arts & Sciences Master Teacher Program, 1991-94.
Academic Adviser, 1/2 of all undergraduate physics majors, 1990-97.
Member, Science Advisory Council, Marietta College, 1992-.
Member, Arts & Sciences Council, University of Toledo, 1993-96.
Coordinator, NSF/REU Summer Research in Physics & Astronomy, Univ. of Toledo, 1995-2000.
Associate Chair, Department of Physics & Astronomy, 2002-2004.