

TECHNOLOGY  
INNOVATION  
LAW AND PRACTICE  
CASES AND MATERIALS

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# TECHNOLOGY INNOVATION LAW AND PRACTICE

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## *CASES AND MATERIALS*

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**MATTHEW  BENDER**

# *DEDICATION*

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*To my father, Theodore J. Hagelin, who gave to me the love of learning*

*and*

*To my wife, Ronile Lawrence, who gave to me the love to learn*



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This book has been a work-in-progress for many years and has benefited greatly from the countless comments, criticisms and suggestions made by generations of Syracuse University College of Law students. Although I cannot possibly thank them all individually, I am deeply grateful for their contributions. However, there are three students who I want to especially thank: Luis Ormaechea, Laura Hadley and Jared Slater, all 2009 graduates of the College of Law. The research performed by Luis, Laura and Jared was outstanding.

I also want to thank my dean, Hannah Arterian, for her generous encouragement and support throughout the writing of this book.





# PREFACE

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My goal in writing *Technology Innovation Law and Practice* is to bring together in a single place what I have learned over the past 25 years of studying, teaching, researching and analyzing the technology innovation process. My work has been in both classroom and clinical settings. This book is a product of both. In the classroom, I have taught nearly 150 credit hours in a course currently titled Technology Transactions. During this time, the topics which I cover have expanded from licensing law and university technology transfer to the 11 chapters included in this book. Also during this time, the reading materials have evolved from a small set of law review articles to a fully-developed set of cases and materials.

In the clinic which I have directed for over 20 years (the Technology Commercialization Research Center), we have undertaken over 100 technology commercialization research projects on behalf of start-up, early-stage, small, medium and large companies, universities, and federal laboratories. Each of these projects has included an in-depth evaluation of the technology under investigation, a comprehensive assessment of alternative market applications and market entry strategies, and a detailed analysis of the legal and regulatory obstacles to the technology's market introduction. This work has given me a keen appreciation of the crucial interrelationship between technology, business and law during the technology innovation process.

*Technology Innovation Law & Practice* is the result of these years of classroom and clinical teaching. The book is a comprehensive collection of cases, statutes, regulations and readings focused on the commercial development of new technologies, primarily by start-up and early-stage companies. I define the technology innovation *process* as the set of decisions and actions by which an invention is transformed from a laboratory prototype into a commercially viable product or process; and I define the technology innovation *period* as the time between the point of invention (reduction to practice) and the point of market introduction. A more informal explanation of technology innovation I sometimes give to people unfamiliar with, or only politely interested in, "innovation" is: "Technology innovation is about how to make money with an invention after it's made."

Technology innovation is a multi-trillion dollar, world-wide activity that is critical to the success of companies, industries, and regional, national and global economic growth. Nonetheless, it has thus far received scant academic attention as an independent field of study in law and engineering schools, and in many business schools. Technology innovation is most often only associated with invention. The implicit assumption is that if an invention is successful in the laboratory, the invention will be successful in the market. This assumption is flat wrong. Moving a technology from the laboratory into the market is a highly deliberative process involving multiple disciplines and multiple professionals.

*Technology Innovation Law and Practice* addresses the gap in academic attention paid to the field of technology innovation. The book provides students, faculty and practitioners, both in law and other disciplines, with a single source of in-depth information on the laws that affect the technology innovation process. The book is unique in its interdisciplinary focus, in its emphasis on start-up and early-stage technology companies, and in its combination of instructional and reference materials.

As noted, technology innovation is a multidisciplinary process in which science,

## *PREFACE*

engineering, business and law must be thoroughly integrated in order to formulate successful business plans and market strategies. *Technology Innovation Law and Practice* encompasses the interdisciplinary nature of technology innovation by covering such topics as the valuation of intellectual property, market structures, financing technology development, taxation of technology creation and transfer, and business organizations and management responsibilities. As the title suggests, the book also emphasizes the *practice* of law — how law is used to achieve desired commercial outcomes. In the questions following the cases, readers are asked to consider how parties might have structured their business relationships differently to accomplish their goals more effectively. Some of the questions focus on possible changes in the parties' underlying legal relationship, while others focus on possible changes in the contract language used to implement their legal relationship.

The role of lawyers in the technology innovation process is often seen as passive. This book proposes a much more proactive role for lawyers. Unfortunately, many non-lawyers view legal services as simply transaction costs that detract from the value of technology innovation. This book seeks to train a new generation of law students who can add value to technology innovation by virtue of their understanding of the interrelated technical and business decisions that determine the course of a new technology's commercial development. The book is also intended to provide non-law students and practicing professionals a basic understanding of the law involved in the technology innovation process.

In short, *Technology Innovation Law and Practice* provides students and practicing professionals with a one-stop, multidisciplinary source of information on the laws and practices that affect the technology innovation process.

Ted Hagelin  
Syracuse University College of Law  
May 2011

# INTRODUCTION

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## DEFINITIONS

The best place to begin the study of “Technology Innovation Law and Practice” is by defining the words.

### Definition of “Technology Innovation”

As discussed in more detail below, the word “technology” comes from the Greek noun *technologia* which means a “systematic solution to a practical problem.” The Greek definition of *technologia* fits well with the patent law definition of “reduction to practice.” In patent law, “reduction to practice” is the date on which an inventor demonstrates the actual operation of an invention. “Reduction to practice” can occur in two ways; *actual* reduction to practice and *constructive* reduction to practice. “Actual” reduction to practice occurs when a physical embodiment of an invention (a prototype) is constructed that works for its intended purpose. “Constructive” reduction to practice occurs when a patent application is filed on an invention that describes the invention in sufficient detail for a person skilled in the art to practice the invention.

Under the recently enacted America Invents Act, “reduction to practice” is no longer relevant to determining patent priority. The first inventor to file a patent application will have priority when this provision of the new Act takes effect on March 16, 2013. Nonetheless, “reduction to practice” is still useful to mark the point of invention and to distinguish invention from innovation.

I will define “technology,” as an invention’s reduction to practice. Using the Greek definition, the point at which a technology is reduced to practice is the point at which a “systematic solution to a practical problem” has been created. This is the point at which a technology comes into existence and the “technology innovation” process begins.

Demonstrating that a technology works to accomplish its intended purpose, however, is not the same as demonstrating that a technology is commercially viable. Before a technology can be shown to be commercially viable, it must undergo a series of tests. Among these tests are alpha testing to determine whether a technology works in a limited usage setting under controlled conditions; beta testing to determine whether a technology works in normal usage and under normal operating conditions; “scale-up” testing to determine whether a technology can be produced in commercially-demanded quantities; manufacturing testing to determine whether a technology can be manufactured at a competitive cost and quality level; and customer testing to determine whether a technology can be used with minimum necessary training and experience. At the conclusion of each of these tests, the design, operation and output of a technology may be refined to maximize its competitive advantage over substitute technologies. This process of testing and refinement is an integral part of the technology innovation process.

The word “innovation” comes from the Latin word *innovationem* which is the noun form of the verb *innovare* meaning “to change.” “Innovare” is a combination of the Latin words *in* (into) and *novous* (new). The contemporary definition of “innovation” is “the introduction of new things or methods.” I will define “innovation” as the process by

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## INTRODUCTION

which a new technology is transformed into a commercially viable product, method or service. The “technology innovation process” is the set of technical, business and legal activities that occur between the time a new technology comes into existence and the time a new technology enters the market.

The “innovation process” can be usefully compared to the “invention process.” As I have defined the term, the “innovation process” occurs between the date an invention is reduced to practice and the date an invention enters the market. The “invention process” can be defined as the date between the *conception* of an invention (in patent law, the date on which a person mentally formulates a complete and operative idea for an invention) and the time the invention is reduced to practice. The “conception” of an invention is always preceded by a period of applied research. Applied research involves the application of basic research to defined, real-world problems. Basic research generates new, fundamental knowledge of the world often in the form of discoveries of principles and theories that can explain physical phenomena, life processes or the interaction of objects and forces on atomic and cosmic scales. The culmination of applied research is the “conception” of a solution to a practical problem.

The distinction between the “invention process” and the “innovation process” is much more than a matter of semantics. The distinction is important in order to recognize the changing roles of different disciplines in the two processes. The “invention process” is largely driven by science and engineering disciplines, although input from other disciplines, for example patent law, can help to guide the “invention process” and reduce wasted time and effort. As noted above, the “innovation process” also involves science and engineering disciplines in the testing and refinement of new technologies. However, the “innovation process” also involves additional disciplines such as management, marketing, sales, finance, patent law, transactional law and business law. Factors affecting such matters as funding, manufacturing, distribution, training, support and service, as well intellectual property, licensing law, regulatory law, taxation, export controls, management responsibilities and securities law must be thoroughly researched and analyzed in order to formulate successful business plans and market strategies.

The distinction between the “invention process” and the “innovation process” is also important in order to recognize the different roles of government in funding invention and innovation. Both at the federal level and the state level, government funding is overwhelmingly directed toward research leading to invention, not innovation. The unstated assumption here is that successful laboratory research will somehow automatically be transformed into successful market innovation. This assumption is patently false. Federal and state governments will never achieve the desired economic growth from their investment in research leading to invention if they do not also invest in research leading to innovation.

A final note on “innovation.” Throughout the book, I will often use the terms *innovation* and *commercialization* interchangeably. The word *commercialization* is the noun form of the verb *commercialize* which means to “offer for sale or make available as a commodity.” The root word “commerce” comes from the Latin noun *commercium* which is a combination of the Latin words *com* (together) and *merx* (merchandise). The contemporary definition of “commerce” (the exchange of goods and commodities) is closely aligned with its Latin origins and encompassed within my definition of “innovation.”

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## INTRODUCTION

### Definition of “Law and Practice”

Technology innovation *law*, like other fields of law, consists of judicial and administrative cases, agency determinations and interpretations, federal and state statutes, and administrative rules and regulations. However, unlike other fields of law, technology innovation “law” is not a single, unified body of legal doctrine. Contract law, for example, consists of well-defined, interrelated core principles and rules. Technology innovation “law,” on the other hand, consists of multiple fields of law that each affects the technology innovation process. The inherently *interdisciplinary* nature of the technology innovation process noted above is mirrored in the inherently *intradisciplinary* nature of technology innovation law. This book covers the main fields of law that affect the technology innovation process.

Technology innovation law *practice* focuses on the role of lawyers in participating in, and implementing, strategic decisions regarding the commercial development of new technologies. An old adage in the field of technology innovation is that the engineers tell you what is *possible*, the business people tell you what is *profitable*, and the lawyers tell you what is *permissible*. This book, however, contemplates a much more proactive role for lawyers. Unfortunately, in the eyes of many non-lawyers engaged in technology innovation, legal services are viewed as simply transaction costs at best, or as needless obstacles at worst. This book seeks to train a new generation of law students to add value to the technology innovation process through an understanding of the interrelated technical and business decisions which determine the course of a technology’s commercial development.

Throughout the book, students are exposed to the practical, technical and business contexts within which disputes have arisen, and asked to consider how the parties might have structured their relationship differently to avoid the disputes, or to accomplish their objectives in more effective and efficient ways. In some cases, these practice questions may focus on changes in the parties’ underlying business relationship, in others they may focus on changes in the contract language used to implement the business relationship. These practice questions may also concern overarching policies that impact the parties’ business conduct. Of course, a lawyer practicing in the field of technology innovation cannot be an expert on all technical and business matters. However, the better a lawyer understands these matters, and appreciates the input of other professionals in addressing matters within their areas of expertise, the greater the value the lawyer will be able to contribute to the technology innovation process.

### THE IMPORTANCE OF TECHNOLOGY INNOVATION

Commercial development of new technology is a multi-trillion dollar activity that is critical to the success of start-up, early-stage, small, medium and large companies, as well as to regional and national economies, and the global economy.

An indication of the importance of technology innovation to a company can be seen in the company’s *book value* to *market capitalization value* ratio. A company’s *book value* is calculated by summing the value of its tangible assets including cash, cash equivalents, marketable securities, accounts receivable, and plant, property and equipment, minus its liabilities. A company’s *market capitalization value* is calculated by multiplying the number of shares of outstanding stock by the price per share of the stock. The book to market value ratio tells you the percentage of a company’s value that is attributable to its

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## *INTRODUCTION*

intangible assets and intellectual property assets. The percentage of a company's value attributable to intangible and intellectual property assets is a good surrogate for the value of a company attributable to its technology innovation activities.

For leading technology companies, their book to market value ratio is striking. For example, in 2009 Google's total assets were \$40,497,000 and its market capitalization value was \$108,000,000,000. Google's book to market value ratio, therefore, was .037%. Less than .1% of Google's market value was attributable to its tangible assets and more than 99.9% of its market value was attributable to its intangible and intellectual property assets. Stated differently, investors in Google valued its technology innovation activities more than 2,700 times its tangible assets.

Apple's book to market value ratio is even more striking. In 2010, Apple had total tangible assets of \$48,140,000 and its market capitalization value was \$242,000,000,000. Apple's book to market value ratio, therefore, was .02%. Investors in Apple valued its technology innovation activities more than 5,000 times its tangible assets.

Successful technology innovation is also widely believed to be the primary engine of regional and national economic growth. The leading regions of technology-driven economic growth are generally centered around major research universities. In the U.S., Silicon Valley, Boston, Raleigh-Durham and Austin are examples of regions that have experienced dramatic economic growth due largely to the commercialization of university-generated technologies. In addition, every state has programs designed to support the creation of new companies most often through the funding of research and development, or the provision of seed-stage operating capital. The goals of these programs are to advance the economic competitiveness of the state by promoting high-value technology output, creating well-paying jobs, and attracting new firms and professional talent.

The U.S. federal government also has many programs designed to support start-up and small-business technology-based companies. Two of the most important of these federal programs are the Small Business Innovation Research (SBIR) program and the Small Business Technology Transfer (STTR) program. In 2009, these two programs awarded small business companies nearly \$2 billion to pursue research of new, cutting-edge technologies. The SBIR and STTR programs are covered in detail section 11.1 of the book.

The importance of technology innovation to regional and national economic growth is reflected in global statistics. The aggregate global value of technology innovation activities is tracked by the National Science Foundation (NSF) and published annually in NSF's Science & Engineering Indicators. In the 2010 Science & Engineering Indicators, NSF reported that in 2007 knowledge-intensive and technology-intensive industries combined contributed nearly \$16 trillion to the global economic output, approximately 30% of the world GDP. (Although the NSF's definitions of "knowledge-intensive" and "technology-intensive" differ somewhat from our definition of "technology innovation," these definitions are sufficiently similar to provide a fairly accurate portrait of the importance of technology innovation to the world economy.) The largest global value-added segment of these industries was commercial knowledge-intensive services which increased from \$4.5 trillion in 1995 to \$9.5 trillion in 2007. The United States led the world in value-added commercial knowledge-intensive services with \$3.3 trillion in 2007 followed by the European Union with \$2.9 trillion.



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## *INTRODUCTION*

Outside of commercial knowledge-intensive services, five high-technology industries accounted for \$1.2 trillion of the value-added total in 2007; communications and semiconductors (\$445 billion), pharmaceuticals (\$319 billion), scientific instruments (\$189 billion), aerospace (\$153 billion), and computers and office machinery (\$114 billion).

These NSF statistics strongly suggest that technology innovation activities are as important to the global economy and world prosperity as they are to local, regional and national economies, and their economic prosperity.

### COVERAGE OF BOOK

Chapter One of the book provides a general background for the study of technology innovation law and practice. Chapter One includes an overview of intellectual property law, an introduction to basic economic concepts, a brief review of finance and accounting principles, a discussion of technology innovation business including different methods to value intellectual property, a comparison of the different perspectives of a transferor and transferee of intellectual property, a brief consideration of the advantages and disadvantages of technology transfers, a discussion of factors to be considered in formulating a technology commercialization strategy, and a brief summary of some of the more important sources of information on markets, companies and patents.

Chapter Two provides an in-depth consideration of licensing law. Licensing law governs the transfer of intellectual property. Licensing law is based on contract law which has been modified to reflect the unique features of intellectual property. Chapter Two includes a section with sample software, product and biotechnology license agreements; a section on the general rights of licensors and licensees which includes consideration of the scope of licensor rights, the relationship between patent licenses and contract law, implied licenses, licensee estoppel, co-owner licenses, license breach and breach remedies, the effect of patent invalidity on licenses, standing of licensees to sue for patent infringement, and patent misuse; a section on the basic terms included in license agreements including implied license terms, grant clauses, license warranties, most-favored licensee clauses, transfers of license agreements, post-license sale restrictions, field of use restrictions, royalties, licenses to improvements, and indemnification; and a final section that considers unilateral licenses which include box-top licenses, shrink-wrap licenses, click-wrap licenses and open source licenses.

Chapter Three covers commercialization of technologies developed by university faculty, staff and students, or through the use of university facilities or equipment. I have already noted the critical role universities play in fueling the technology commercialization process. Chapter Three includes a section on the Bayh-Dole Act, the seminal federal legislation which allows universities to elect to take title to patents resulting from federally funded research, a section on university-industry sponsored research including a discussion of the federal income tax limitations on the conduct of sponsored research, and sections on university intellectual property ownership, university patent enforcement, university-student research responsibilities and university-faculty employment contracts.

Chapter Four considers employer-employee intellectual property rights in industrial settings. Under U.S. patent law, the inventor is always the original owner of a patent. Therefore, a company must obtain patent ownership rights from an employee-inventor

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## *INTRODUCTION*

before the company can commercialize the invention. Chapter Four includes sections on employer shop rights, works made for hire, employer IP rights under employment contracts, state statutory restrictions on IP rights claimed by employers, hold-over agreements, non-disclosure agreements and non-competition agreements. Chapter Five considers experimental use of new technologies in three situations; experimental use as an exception to the Patent Act's public use statutory bar, experimental use as an exemption to patent infringement, and experimental use for pharmaceuticals and medical devices under the Hatch-Waxman Act infringement safe harbor.

Chapter Six considers intellectual property licenses in the case of bankruptcy. Intellectual property licenses pose special problems in bankruptcy because they are executory contracts. Congress has intervened to address some of the problems involved with intellectual property licenses in bankruptcy, but by no means all of problems. Chapter Six includes sections on licensor bankruptcy, licensee bankruptcy, perfecting security interests in copyrights, and perfecting security interests in patents. Chapter Seven covers licensing and antitrust laws. There is a fundamental tension between licensing law and antitrust law because licensing law allows a licensor to limit competition with respect to licensed technology while antitrust law seeks to increase competition in technology markets. The first section in Chapter Six considers the Sherman, Clayton and Federal Trade Commission Acts and the second section covers the Department of Justice-Federal Trade Commission antitrust guidelines for licensing intellectual property.

Chapter Eight looks at tax laws that affect technology creation and transfer. As in all areas of business activity, tax law directly affects the financial results of new technology innovation. Chapter Eight includes sections on the research and experimentation expense deduction, the research and experimentation tax credit, founders' capital contributions to new companies, issuance of stock in exchange for services, license and sale by a patent owner, and sale and exchange by a patent holder. Chapter Nine considers U.S. export controls on dual-use technologies. Dual-use technologies are technologies that are primarily used for civilian purposes, but can also be used for military purposes. Since 9/11, dual-use technologies have become an increasing concern for the Department of Commerce and U.S. technology exporters. Chapter Nine includes a section which provides an overview of the U.S. export control system, a section on "deemed" exports, and sections covering selected export controls and selected recent export violation enforcement cases.

Chapter Ten considers business organizations and management responsibilities. Lawyers who represent entrepreneurs launching start-up companies should know the alternative business forms available to entrepreneurs, and the legal, management and tax consequences associated with these alternative forms of business. Likewise, lawyers advising corporate clients on the actions of directors, officers and majority shareholders should know what fiduciary duties these individuals owe and to whom. Chapter Ten contains sections on the choice of business organization, and management responsibilities including directors', officers' and majority shareholders' fiduciary duties, shareholder direct and derivative suits, usurpation of corporate opportunities and piercing the corporate veil.

Finally, Chapter Eleven considers financing technology innovation. Lawyers representing small-business clients seeking investment capital need to have a basic understanding of government programs available to support small businesses, venture



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## *INTRODUCTION*

capital investment terms, private securities offerings, initial public securities offerings and the possibility of fraud claims in conjunction with private and public sales of securities. Although in many of these areas, the small-business corporate counsel may decide to retain the services of an outside securities law specialists, nonetheless a basic understanding of these areas will enable the corporate counsel to work more effectively with outside counsel and better serve as an intermediary between the corporate client and the outside counsel. Chapter Eleven is intended to provide this basic understanding, and includes sections on the Small Business Innovation Research program, the Small Business Technology Transfer program, private securities offerings, venture capital investments, initial public offerings, fraud in private and public securities offerings, and due diligence in the sale of securities. An especially useful reading in Chapter Eleven is the Glossary of Selected Private Equity Investment Terms, compiled by the Center for Private Equity and Entrepreneurship at the Tuck School of Business at Dartmouth University; reprinted with permission.

The Appendix contains practice exercises. These exercises include the valuation of an early-stage (pre-commercialization) technology, negotiating and drafting a term sheet for a venture capital investment, and negotiating and drafting a technology license agreement.

### ORGANIZATION AND SELECTION OF MATERIALS

The book is intended to be used for both teaching and research purposes. Each chapter of the book begins with an overview of the topics covered in the chapter, each section of the book provides a general introduction to the law covered in the section, and each subsection of the book provides a brief review of the cases and readings contained in the subsection. At the conclusion of each case or reading, there are questions. These questions are intended to probe the readers' understanding of the case or reading and, as noted earlier, prompt critical reflection upon the practical, legal and policy implications of the case or reading. In many instances, these questions may generate opportunities for classroom and online discussions that enhance the educational value of the cases and readings.

At the end of each subsection in the book there are "Case Notes" and "Additional Information." The Case Notes consist of citations to other cases in the topic area along with parenthetical synopses of the holdings in the cases. Case Notes also include hypothetical fact questions drawn from actual cases. The Additional Information consists of treatises, texts and articles dealing with the topic subject matters. The Case Notes and Additional Information are intended to provide the reader with reference sources for further study and research.

In selecting the topics for the book, I have tried to minimize the overlap with other law school courses. My goal in preparing the book was to include in one place all of the legal topics relevant to commercial development of new technologies. Inevitably, this results in some coverage overlap between this book and other law school courses. There are two differences, however, between the topics considered in this book and the topics considered in other law school courses such as patent, bankruptcy, tax and antitrust law. First, the topics included in this book consist of a small subgroup of topics covered in other law school courses and pertain directly to technology innovation. Second, the topics included in this book are considered in a transactional context rather than a doctrinal

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## *INTRODUCTION*

context. Of course, readers who are already familiar with the material in a topic area can skip, or skim, the readings.

For the most part, the topics covered in the book are equally applicable to small and large firms. However, the focal point of the book is on small firms and the commercialization of their early-stage technologies. The chapters on Commercializing University Technologies, Business Organizations and Management Responsibilities, and Financing Technology Innovation are primarily directed to small firms. This is especially the case in the chapter on Financing Technology Innovation which includes sections on the SBIR and STTR programs, registration exemptions for private securities offerings, venture capital investments, and initial public offerings.

\*\*\*\*

A final word. As you embark on the study of technology innovation law and practice, I hope you will find the field as interesting, as rewarding and as worthwhile as I do. I also hope you will enjoy reading this book as much as I did preparing it.

# SUMMARY TABLE OF CONTENTS

Preface .....	vii
Introduction .....	ix

**Chapter 1                    TECHNOLOGY INNOVATION FUNDAMENTALS:  
INTELLECTUAL PROPERTY, ECONOMICS, FINANCE  
AND BUSINESS ..... 1**

---

1.1.	ETYMOLOGY OF “TECHNOLOGY TRANSFER” .....	1
1.2	CONTEMPORARY DEFINITIONS OF TERMS .....	3
1.3	NATURE OF TECHNOLOGY TRANSFER PROCESS .....	5
1.4	LICENSES AS PROPERTY RIGHTS .....	6
1.5	INTELLECTUAL PROPERTY OVERVIEW .....	7
1.6	BASIC ECONOMIC CONCEPTS .....	17
1.7	FINANCIAL AND ACCOUNTING PRINCIPLES .....	35
1.8	BUSINESS OF TECHNOLOGY INNOVATION .....	38
1.9	TECHNOLOGY TRANSFEROR/TRANSFEREE PERSPECTIVES ....	69
1.10	ADVANTAGES AND DISADVANTAGES OF TECHNOLOGY TRANSFERS .....	75
1.11	FORMULATING A TECHNOLOGY INNOVATION STRATEGY ....	76

**Chapter 2                    LICENSING LAW ..... 91**

---

2.1	SAMPLE LICENSE AGREEMENTS .....	91
2.2	RIGHTS OF LICENSORS AND LICENSEES .....	124
2.3	LICENSE TERMS .....	252
2.4	UNILATERAL LICENSES .....	427

**Chapter 3                    COMMERCIALIZING UNIVERSITY  
TECHNOLOGIES ..... 485**

---

3.1	THE BAYH-DOLE ACT .....	486
3.2	UNIVERSITY-INDUSTRY SPONSORED RESEARCH .....	540
3.3	UNIVERSITY INTELLECTUAL PROPERTY OWNERSHIP .....	576
3.4	UNIVERSITY PATENT ENFORCEMENT .....	635
3.5	UNIVERSITY-STUDENT RESEARCH RESPONSIBILITIES .....	651
3.6	UNIVERSITY-FACULTY EMPLOYMENT CONTRACTS .....	662

---

*SUMMARY TABLE OF CONTENTS*

<b>Chapter 4</b>	<b>INDUSTRY EMPLOYER-EMPLOYEE INTELLECTUAL PROPERTY RIGHTS</b> .....	<b>693</b>
4.1	EMPLOYER SHOP RIGHTS .....	693
4.2	WORKS MADE FOR HIRE .....	704
4.3	EMPLOYER IP RIGHTS UNDER EMPLOYMENT CONTRACTS . . .	715
4.4	STATE STATUTORY RESTRICTIONS ON EMPLOYER IP RIGHTS .	729
4.5	HOLD-OVER AGREEMENTS .....	743
4.6	NON-DISCLOSURE AGREEMENTS .....	758
4.7	NON-COMPETITION AGREEMENTS .....	779
<b>Chapter 5</b>	<b>EXPERIMENTAL USE OF NEW TECHNOLOGY</b> .....	<b>797</b>
5.1	EXPERIMENTAL USE EXCEPTION TO PUBLIC USE STATUTORY BAR .....	797
5.2	EXPERIMENTAL USE EXEMPTION TO PATENT INFRINGEMENT .....	807
5.3	HATCH-WAXMAN ACT INFRINGEMENT SAFE HARBOR .....	820
<b>Chapter 6</b>	<b>BANKRUPTCY</b> .....	<b>831</b>
6.1	LICENSOR BANKRUPTCY .....	832
6.2	LICENSEE BANKRUPTCY .....	844
6.3	PERFECTING SECURITY INTERESTS IN COPYRIGHTS .....	851
6.4	PERFECTING SECURITY INTERESTS IN PATENTS .....	861
<b>Chapter 7</b>	<b>LICENSING AND ANTITRUST LAW</b> .....	<b>873</b>
7.1	SHERMAN, CLAYTON AND FEDERAL TRADE COMMISSION ACTS .....	875
7.2	DOJ-FTC ANTITRUST LICENSING GUIDELINES .....	893
<b>Chapter 8</b>	<b>TAX EFFECTS OF TECHNOLOGY CREATION AND TRANSFER</b> .....	<b>903</b>
8.1	RESEARCH AND EXPERIMENTATION EXPENSE DEDUCTIONS .	905
8.2	RESEARCH AND EXPERIMENTATION TAX CREDITS .....	923
8.3	FOUNDERS' CAPITAL CONTRIBUTIONS .....	945
8.4	STOCK IN EXCHANGE FOR SERVICES .....	957
8.5	LICENSE OR SALE BY THE PATENT OWNER .....	985
8.6	SALE OR EXCHANGE BY THE PATENT HOLDER .....	1000
<b>Chapter 9</b>	<b>U.S. TECHNOLOGY EXPORT CONTROLS</b> .....	<b>1027</b>
9.1	OVERVIEW OF EXPORT CONTROL SYSTEM .....	1028
9.2	DEEMED EXPORTS .....	1063

---

*SUMMARY TABLE OF CONTENTS*

9.3	SELECTED EXPORT CONTROLS .....	1078
9.4	SELECTED RECENT ENFORCEMENT CASES .....	1096
<b>Chapter 10</b>	<b>BUSINESS ORGANIZATIONS AND MANAGEMENT RESPONSIBILITIES .....</b>	<b>1107</b>
10.1	CHOICE OF BUSINESS ORGANIZATION .....	1107
10.2	MANAGEMENT RESPONSIBILITIES .....	1116
<b>Chapter 11</b>	<b>FINANCING TECHNOLOGY INNOVATION .....</b>	<b>1181</b>
11.1	SMALL BUSINESS INNOVATION RESEARCH (SBIR) AND SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PROGRAMS .....	1182
11.2	PRIVATE SECURITIES OFFERINGS .....	1224
11.3	FRAUD IN PRIVATE SECURITIES OFFERINGS .....	1241
11.4	VENTURE CAPITAL INVESTMENTS .....	1256
11.5	OTHER FORMS OF FINANCING .....	1317
11.6	INITIAL PUBLIC OFFERINGS (IPOS) .....	1327
11.7	FRAUD IN PUBLIC SECURITIES OFFERINGS .....	1379
11.8	DUE DILIGENCE .....	1401
<b>APPENDIX</b>	<b>.....</b>	<b>1419</b>
	PSA-X Valuation Exercise .....	1419
	BioFilter Negotiation and Drafting Exercises .....	1422
	BioFilter Venture Capital Investment Exercise .....	1427
	BioFilter Licensing Agreement .....	1429
<b>TABLE OF CASES</b>	<b>.....</b>	<b>TC-1</b>
<b>INDEX</b>	<b>.....</b>	<b>I-1</b>



# TABLE OF CONTENTS

<b>Chapter 1</b>	<b>TECHNOLOGY INNOVATION FUNDAMENTALS: INTELLECTUAL PROPERTY, ECONOMICS, FINANCE AND BUSINESS</b> .....	<b>1</b>
1.1.	ETYMOLOGY OF “TECHNOLOGY TRANSFER” .....	1
1.2	CONTEMPORARY DEFINITIONS OF TERMS .....	3
1.3	NATURE OF TECHNOLOGY TRANSFER PROCESS .....	5
1.4	LICENSES AS PROPERTY RIGHTS .....	6
1.5	INTELLECTUAL PROPERTY OVERVIEW .....	7
1.5.1	Patents .....	8
1.5.2	Copyrights .....	12
1.5.3	Trade Secrets .....	14
1.6	BASIC ECONOMIC CONCEPTS .....	17
1.6.1	Macro-Economics and Micro-Economics .....	18
1.6.2	Unique Economic Characteristics of Intellectual Property .....	26
1.6.3	Market Structures .....	31
1.7	FINANCIAL AND ACCOUNTING PRINCIPLES .....	35
1.7.1	Types of Assets .....	35
1.7.2	Types of Financial Reports .....	36
1.8	BUSINESS OF TECHNOLOGY INNOVATION .....	38
1.8.1	Risk and Return .....	39
1.8.2	Valuation of Intellectual Property .....	42
1.8.3	Patent Infringement Damages and Patent License Valuations .....	55
	<i>Uniloc USA, Inc. v. Microsoft Corp.</i> .....	56
	Questions .....	67
	Case Notes .....	67
1.9	TECHNOLOGY TRANSFEROR/TRANSFEREE PERSPECTIVES ....	69
1.9.1	Technology Value .....	69
1.9.2	Transferor Perspective .....	70
1.9.3	Transferee Perspective .....	71
1.10	ADVANTAGES AND DISADVANTAGES OF TECHNOLOGY TRANSFERS .....	73
1.10.1	Advantages .....	73
1.10.2	Disadvantages .....	75
1.11	FORMULATING A TECHNOLOGY INNOVATION STRATEGY ....	76
1.11.1	Identifying The Technology .....	76
1.11.2	Considering Potential Applications .....	77
1.11.3	The Scope of Intellectual Property Protection .....	78
1.11.4	Technical Advantages and Disadvantages .....	79
1.11.5	Defining Potential Markets .....	80

---

**TABLE OF CONTENTS**

1.11.6	Profiles of Firms In A Market . . . . .	82
1.11.7	Terms and Conditions of a Technology Transfer . . . . .	84
1.11.8	Sources of Information on Markets, Companies and Patents . . . . .	88
<b>Chapter 2</b>	<b>LICENSING LAW . . . . .</b>	<b>91</b>
2.1	SAMPLE LICENSE AGREEMENTS . . . . .	91
2.1.1	Software License . . . . .	92
	Questions . . . . .	101
2.1.2	Product License . . . . .	101
	Questions . . . . .	112
2.1.3	Biotechnology License . . . . .	112
	Questions . . . . .	122
2.2	RIGHTS OF LICENSORS AND LICENSEES . . . . .	123
2.2.1	Scope of Licensor Rights . . . . .	124
	<i>General Talking Pictures Corporation v. Western Electric</i> <i>Company</i> . . . . .	125
	Questions . . . . .	127
	<i>Mallinckrodt v. Medipart</i> . . . . .	127
	Questions . . . . .	134
	Case Notes . . . . .	134
2.2.2	Patent Licenses And Contract Law . . . . .	135
	<i>Aronson v. Quick Point Pencil Company</i> . . . . .	136
	Questions . . . . .	141
	Case Notes . . . . .	141
2.2.3	Implied Licenses . . . . .	142
	<i>Suessen-Schurr v. Schubert</i> . . . . .	143
	Questions . . . . .	148
	<i>Travelers Express v. American Express Integrated Payment</i> . . . . .	148
	Questions . . . . .	154
	<i>Jacobs v. Nintendo of America, Inc.</i> . . . . .	154
	Questions . . . . .	158
	Case Notes . . . . .	158
2.2.4	Licensee Estoppel . . . . .	159
	<i>Lear v. Adkins</i> . . . . .	161
	Questions . . . . .	170
	<i>Medimmune v. Genentech</i> . . . . .	170
	Questions . . . . .	177
	Case Notes . . . . .	177
2.2.5	Co-Owner Licenses . . . . .	180
	<i>Ethicon v. United States Surgical Corporation</i> . . . . .	181
	Questions . . . . .	188



---

**TABLE OF CONTENTS**

	Case Notes . . . . .	189
2.2.6	License Breach . . . . .	190
	<i>Institut Pasteur v. Cambridge Biotech</i> . . . . .	190
	Questions . . . . .	196
	Case Notes . . . . .	196
2.2.7	License Breach Remedies . . . . .	197
	<i>Monsanto Company v. McFarling</i> . . . . .	199
	Questions . . . . .	205
	<i>XCO International v. Pacific Scientific</i> . . . . .	205
	Questions . . . . .	209
	<i>EBay v. Mercexchange</i> . . . . .	210
	Questions . . . . .	213
	Case Notes . . . . .	214
2.2.8	Patent Invalidity . . . . .	216
	<i>Tuskos Engineering v. Tuskos</i> . . . . .	217
	Questions . . . . .	220
	<i>Cordis v. Medtronic</i> . . . . .	220
	Questions . . . . .	224
	Case Notes . . . . .	224
2.2.9	Standing to Sue . . . . .	225
	<i>Abbott Laboratories v. Diamedix Corp.</i> . . . . .	226
	Questions . . . . .	232
	<i>McNeilab v. Scandipharm and BASF</i> . . . . .	232
	Questions . . . . .	236
	Case Notes . . . . .	237
2.2.10	Patent Misuse . . . . .	238
	<i>U.S. Philips Corporation v. Int'l Trade Comm.</i> . . . . .	240
	Questions . . . . .	250
	Case Notes . . . . .	250
2.3	LICENSE TERMS . . . . .	252
2.3.1	Implied License Terms . . . . .	252
	<i>Eli Lilly and Co. v. Genentech, Inc.</i> . . . . .	253
	Questions . . . . .	256
	<i>Hirsch-Chemie Ltd. v. Johns Hopkins University</i> . . . . .	257
	Questions . . . . .	265
	<i>Meijer, Inc. v. Abbott Laboratories</i> . . . . .	266
	Questions . . . . .	268
	Case Notes . . . . .	269
2.3.2	Grant Clauses . . . . .	271
	<i>Apple Computer, Inc. v. Microsoft Corp.</i> . . . . .	271
	Questions . . . . .	276

---

**TABLE OF CONTENTS**

	<i>Intel Corp. v. U.S. Int'l Trade Comm.</i> . . . . .	276
	Questions . . . . .	280
	Case Notes . . . . .	280
2.3.3	License Warranties . . . . .	282
	<i>Chatlos Systems v. National Cash Register</i> . . . . .	283
	Questions . . . . .	291
	<i>Transport Corporation of America v. IBM</i> . . . . .	291
	Questions . . . . .	297
	<i>Meadow River v. University of Georgia</i> . . . . .	297
	Questions . . . . .	302
	<i>VRT, Inc. v. Dutton-Lainson Company</i> . . . . .	302
	Questions . . . . .	305
	Case Notes . . . . .	306
2.3.4	Most-Favored Licensee Clauses . . . . .	307
	<i>Epic Systems v. Allcare Health Management</i> . . . . .	308
	Questions . . . . .	313
	<i>SGK v. Hercules, Inc.</i> . . . . .	314
	Questions . . . . .	318
	<i>Eagle Comtronics v. Pico Products</i> . . . . .	319
	Questions . . . . .	320
	<i>Wang Laboratories v. Oki Electric Industry</i> . . . . .	321
	Questions . . . . .	324
	Case Notes . . . . .	325
2.3.5	License Transfers . . . . .	326
	<i>Intergraph v. Intel Corporation</i> . . . . .	328
	Questions . . . . .	331
	<i>PPG Industries, Inc. v. Guardian Industries Corp.</i> . . . . .	332
	Questions . . . . .	338
	<i>Cook Inc. v. Boston Scientific Corp.</i> . . . . .	338
	Questions . . . . .	345
	<i>Rhone-Poulenc Agro v. DeKalb Genetics</i> . . . . .	345
	Questions . . . . .	350
	Case Notes . . . . .	351
2.3.6	Post-Sale Restrictions . . . . .	353
	<i>Pioneer Hi-bred Int'l v. Ottawa Plant Food</i> . . . . .	354
	Questions . . . . .	360
	<i>Adobe Systems v. Stargate Software</i> . . . . .	361
	Questions . . . . .	366
	<i>Quanta Computer, Inc. v. LG Electronics, Inc.</i> . . . . .	366
	Questions . . . . .	374
	Case Notes . . . . .	375

---

**TABLE OF CONTENTS**

2.3.7	Field-of-Use Restrictions . . . . .	376
	<i>Igen Int'l v. Roche Diagnostics GMBH</i> . . . . .	377
	Questions . . . . .	381
	Case Notes . . . . .	381
2.3.8	Best Efforts Clauses . . . . .	382
	<i>Intervisual Communications v. Volkert</i> . . . . .	383
	Questions . . . . .	388
	<i>Permanence Corporation v. Kennametal, Inc.</i> . . . . .	389
	Questions . . . . .	393
	Case Notes . . . . .	394
2.3.9	Royalties . . . . .	395
	<i>Scheiber v. Dolby Laboratories</i> . . . . .	397
	Questions . . . . .	401
	<i>Bayer AG v. Housey Pharmaceuticals, Inc.</i> . . . . .	401
	Questions . . . . .	406
	Case Notes . . . . .	407
2.3.10	Licenses to Improvements . . . . .	408
	<i>Gonser v. Leland Detroit Mfg. Co.</i> . . . . .	409
	Questions . . . . .	414
	Antitrust Guidelines for the Licensing of Intellectual Property . . . .	415
	Case Notes . . . . .	416
2.3.11	Indemnification . . . . .	418
	<i>RFR Industries, Inc. v. Rex-Hide Industries, Inc</i> . . . . .	419
	Questions . . . . .	425
	Case Notes . . . . .	425
2.4	UNILATERAL LICENSES . . . . .	427
2.4.1	Box-Top Licenses . . . . .	428
	<i>Step-Saver Data Systems v. Wyse Technology</i> . . . . .	428
	Questions . . . . .	436
	Case Notes . . . . .	436
2.4.2	Shrink-Wrap Licenses . . . . .	438
	<i>ProCD v. Zeidenberg</i> . . . . .	438
	Questions . . . . .	444
	<i>Bowers v. Baystate Technologies</i> . . . . .	444
	Questions . . . . .	450
	Case Notes . . . . .	450
2.4.3	Click-Wrap Licenses . . . . .	452
	<i>Specht v. Netscape Communications Corp.</i> . . . . .	453
	Questions . . . . .	460
	Case Notes . . . . .	460
2.4.4	Open Source Licenses . . . . .	462

---

**TABLE OF CONTENTS**

	<i>GNU General Public License, Version 2, June 1991</i> . . . . .	463
	Questions . . . . .	468
	<i>The SCO Group, Inc. v. Novell, Inc.</i> . . . . .	469
	Questions . . . . .	482
	Case Notes . . . . .	482
<b>Chapter 3</b>	<b>COMMERCIALIZING UNIVERSITY TECHNOLOGIES . . . . .</b>	<b>485</b>
3.1	THE BAYH-DOLE ACT . . . . .	486
3.1.1	Legislation . . . . .	486
	<i>35 U.S.C.A. §§ 200–212</i> . . . . .	486
	Questions . . . . .	496
	<i>Campbell Plastics Engineering &amp; Mfg., Inc. v. Brownlee</i> . . . . .	496
	Questions . . . . .	502
	Case Notes . . . . .	503
3.1.2	March-In Rights . . . . .	504
	<i>In The Case of Norvir® Manufactured by Abbott     Laboratories, Inc.</i> . . . . .	505
	Questions . . . . .	510
	Determination in the Case of Petition of Cellpro, Inc. . . . .	510
	Questions . . . . .	516
	Case Notes . . . . .	516
3.1.3	Standing to Sue . . . . .	517
	<i>Service Engineering v. U.S.D.A.</i> . . . . .	518
	Questions . . . . .	523
	<i>Nutrition 21 v. United States</i> . . . . .	523
	Questions . . . . .	529
	Case Notes . . . . .	529
3.1.4	Effect of Bayh-Dole on University-Faculty Relationship . . . . .	530
	<i>Platzer v. Sloan-Kettering Institute</i> . . . . .	530
	Questions . . . . .	536
	<i>Therien v. The Trustees of the University of Pennsylvania</i> . . . . .	536
	Questions . . . . .	539
	Case Notes . . . . .	540
3.2	UNIVERSITY-INDUSTRY SPONSORED RESEARCH . . . . .	540
3.2.1	University Sponsored Research Agreements . . . . .	541
	Survey of Sponsored Research Contract Terms . . . . .	541
3.2.2	Income Tax Limitations on Sponsored Research . . . . .	550
	<i>Rev. Proc. 2007-47</i> . . . . .	551
	Questions . . . . .	555
	Note on Public Policy Regarding Industry-Sponsored Research . . . . .	556

---

**TABLE OF CONTENTS**

	Questions . . . . .	564
	Case Notes . . . . .	565
3.2.3	University-Sponsor Disputes . . . . .	566
	<i>Wisconsin Alumni Research Foundation v. Xenon</i>	
	<i>Pharmaceuticals, Inc.</i> . . . . .	566
	Questions . . . . .	576
3.3	UNIVERSITY INTELLECTUAL PROPERTY OWNERSHIP . . . . .	576
3.3.1	Sample Intellectual Property Policy . . . . .	577
	Syracuse University Policy on Ownership and Management of	
	Intellectual Property . . . . .	578
	Questions . . . . .	580
	Case Notes . . . . .	581
3.3.2	University-Faculty IP Ownership Disputes . . . . .	583
	<i>Fenn v. Yale University</i> . . . . .	583
	Questions . . . . .	595
	<i>University Patents v. Kligman</i> . . . . .	596
	Questions . . . . .	606
	<i>E.I. Du Pont Nemours &amp; Co. v. Okuley</i> . . . . .	607
	Questions . . . . .	612
	Case Notes . . . . .	613
3.3.3	University-Student IP Ownership Disputes . . . . .	614
	<i>University of West Virginia v. Vanvoorhies</i> . . . . .	615
	Questions . . . . .	624
	Case Notes . . . . .	624
3.3.4	University Licensing Policies . . . . .	625
	In the Public Interest: Nine Points to Consider in Licensing University	
	Technology . . . . .	626
	Questions . . . . .	634
3.4	UNIVERSITY PATENT ENFORCEMENT . . . . .	635
	<i>University of Rochester v. G.D. Searl</i> . . . . .	636
	Questions . . . . .	642
	<i>In re Columbia University Patent Litigation</i> . . . . .	642
	Questions . . . . .	650
	Case Notes . . . . .	650
3.5	UNIVERSITY-STUDENT RESEARCH RESPONSIBILITIES . . . . .	651
	<i>Chou v. University of Chicago</i> . . . . .	651
	Questions . . . . .	660
	Case Notes . . . . .	660
3.6	UNIVERSITY-FACULTY EMPLOYMENT CONTRACTS . . . . .	662
	<i>Stanford v. Roche</i> . . . . .	662
	Questions . . . . .	674

---

**TABLE OF CONTENTS**

	<i>Shaw v. University of California</i> . . . . .	675
	Questions . . . . .	682
	<i>Kucharczyk v. University of California</i> . . . . .	682
	Questions . . . . .	691
	Case Notes (Review) . . . . .	692
<b>Chapter 4</b>	<b>INDUSTRY EMPLOYER-EMPLOYEE INTELLECTUAL PROPERTY RIGHTS . . . . .</b>	<b>693</b>
4.1	<b>EMPLOYER SHOP RIGHTS . . . . .</b>	<b>693</b>
	<i>United States v. Dubilier Condenser</i> . . . . .	694
	Questions . . . . .	698
	<i>Schroeder v. Tracor</i> . . . . .	698
	Questions . . . . .	701
	Case Notes . . . . .	702
4.2	<b>WORKS MADE FOR HIRE . . . . .</b>	<b>704</b>
	<i>MacLean Associates v. Mercer-Meidinger-Hansen</i> . . . . .	704
	Questions . . . . .	713
	Case Notes . . . . .	713
4.3	<b>EMPLOYER IP RIGHTS UNDER EMPLOYMENT CONTRACTS . . .</b>	<b>715</b>
	<i>Andreaggi v. Relis</i> . . . . .	716
	Questions . . . . .	724
	<i>Jamesbury Corp. v. Worcester Valve Co.</i> . . . . .	725
	Questions . . . . .	728
	Case Notes . . . . .	728
4.4	<b>STATE STATUTORY RESTRICTIONS ON EMPLOYER IP RIGHTS .</b>	<b>729</b>
	Minn. Stat. Ann. § 181.78 (1980) . . . . .	730
	Questions . . . . .	730
	<i>Waterjet Tech., Inc. v. Flow Int'l Corp.</i> . . . . .	730
	Questions . . . . .	735
	<i>Cadence Design Sys. v. Bhandari</i> . . . . .	735
	Questions . . . . .	741
	Case Notes . . . . .	741
4.5	<b>HOLD-OVER AGREEMENTS . . . . .</b>	<b>743</b>
	<i>Ingersoll-Rand Company v. Ciavatta</i> . . . . .	743
	Questions . . . . .	756
	Case Notes . . . . .	757
4.6	<b>NON-DISCLOSURE AGREEMENTS . . . . .</b>	<b>758</b>
	<i>Revere Transducers, Inc. v. Deere &amp; Comp.</i> . . . . .	759
	Questions . . . . .	770
	<i>Celeritas Technologies v. Rockwell International</i> . . . . .	771
	Questions . . . . .	776

---

**TABLE OF CONTENTS**

	Case Notes . . . . .	776
4.7	NON-COMPETITION AGREEMENTS . . . . .	779
	<i>Verizon Communications Inc. v. Pizzirani</i> . . . . .	780
	Questions . . . . .	790
	<i>EMSL Analytical, Inc., v. Younker</i> . . . . .	791
	Questions . . . . .	794
	Case Notes . . . . .	794
<b>Chapter 5                   EXPERIMENTAL USE OF NEW TECHNOLOGY . . . . .</b>		<b>797</b>
5.1	EXPERIMENTAL USE EXCEPTION TO PUBLIC USE STATUTORY BAR . . . . .	797
	<i>Clock Spring, L.P. v. Wrapmaster, Inc.</i> . . . . .	798
	Questions . . . . .	804
	Case Notes . . . . .	804
5.2	EXPERIMENTAL USE EXEMPTION TO PATENT INFRINGEMENT . . . . .	807
	<i>Madey v. Duke University</i> . . . . .	807
	Questions . . . . .	817
	Case Notes . . . . .	818
5.3	HATCH-WAXMAN ACT INFRINGEMENT SAFE HARBOR . . . . .	820
	<i>Merck KGaA v. Integra Lifesciences I, Ltd.</i> . . . . .	822
	Questions . . . . .	828
	Case Notes . . . . .	829
<b>Chapter 6                   BANKRUPTCY . . . . .</b>		<b>831</b>
6.1	LICENSOR BANKRUPTCY . . . . .	832
	<i>In re Cellnet Data Systems, Inc.</i> . . . . .	833
	Questions . . . . .	842
	Case Notes . . . . .	842
6.2	LICENSEE BANKRUPTCY . . . . .	844
	<i>In re Aerobox Composite Structures, LLC.</i> . . . . .	845
	Questions . . . . .	849
	Case Notes . . . . .	849
6.3	PERFECTING SECURITY INTERESTS IN COPYRIGHTS . . . . .	851
	<i>World Auxiliary Power v. Silicon Valley Bank</i> . . . . .	853
	Questions . . . . .	859
	Case Notes . . . . .	860
6.4	PERFECTING SECURITY INTERESTS IN PATENTS . . . . .	861
	<i>Cybernetic Services v. Matsco Financial Corporation</i> . . . . .	862
	Questions . . . . .	870
	Case Notes . . . . .	871

---

**TABLE OF CONTENTS**

<b>Chapter 7</b>	<b>LICENSING AND ANTITRUST LAW</b>	<b>873</b>
7.1	SHERMAN, CLAYTON AND FEDERAL TRADE COMMISSION ACTS	875
	<i>Illinois Tool Works v. Independent Ink</i>	875
	Questions	881
	<i>Static Control Components, Inc. v. Lexmark International, Inc.</i>	882
	Questions	891
	Case Notes	891
7.2	DOJ-FTC ANTITRUST LICENSING GUIDELINES	893
	ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY	893
	Questions	901
<b>Chapter 8</b>	<b>TAX EFFECTS OF TECHNOLOGY CREATION AND TRANSFER</b>	<b>903</b>
8.1	RESEARCH AND EXPERIMENTATION EXPENSE DEDUCTIONS	905
	<i>I.R.C. § 174</i>	905
	<i>Treas. Reg. § 1.174-1</i>	906
	<i>Treas. Reg. § 1.174-2</i>	907
	<i>Treas. Reg. § 1.174-3</i>	910
	<i>Treas. Reg. § 1.174-4</i>	910
	Questions	911
	<i>LDL Research &amp; Development II, Ltd. v. Commissioner of Internal Revenue</i>	912
	Questions	920
	Case Notes	921
8.2	RESEARCH AND EXPERIMENTATION TAX CREDITS	923
	<i>I.R.C. § 41</i>	924
	<i>Treas. Reg. § 1.41-2</i>	929
	Questions	931
	<i>Eustace v. Commissioner of Internal Revenue</i>	932
	Questions	934
	<i>Tax and Accounting Software Corp. v. United States</i>	935
	Questions	943
	Case Notes	944
8.3	FOUNDERS' CAPITAL CONTRIBUTIONS	945
	<i>I.R.C. § 1001</i>	945
	<i>I.R.C. § 351</i>	945
	<i>Treas. Reg. § 1.351-1</i>	946
	<i>I.R.C. § 358</i>	947
	<i>Treas. Reg. § 1.358-1</i>	948



---

*TABLE OF CONTENTS*

	Questions . . . . .	948
	<i>Peracchi v. Commissioner of Internal Revenue</i> . . . . .	949
	Questions . . . . .	955
	Case Notes . . . . .	956
8.4	STOCK IN EXCHANGE FOR SERVICES . . . . .	957
	<i>I.R.C. § 83</i> . . . . .	958
	Questions . . . . .	960
	<i>Treas. Reg. § 1.83-1</i> . . . . .	961
	Questions . . . . .	964
	<i>Treas. Reg. § 1.83-2</i> . . . . .	964
	Questions . . . . .	965
	<i>Treas. Reg. § 1.83-3</i> . . . . .	965
	Questions . . . . .	971
	<i>Treas. Reg. § 1.83-5</i> . . . . .	971
	Questions . . . . .	974
	<i>Treas. Reg. § 1.83-6</i> . . . . .	974
	Questions . . . . .	975
	<i>Treas. Reg. § 1.83-7</i> . . . . .	976
	Questions . . . . .	978
	<i>Robinson v. Commissioner of Internal Revenue</i> . . . . .	978
	Questions . . . . .	981
	<i>Page, Inc. v. Commissioner of Internal Revenue</i> . . . . .	981
	Questions . . . . .	983
	Case Notes . . . . .	983
8.5	LICENSE OR SALE BY THE PATENT OWNER . . . . .	985
	<i>I.R.C. § 61</i> . . . . .	985
	<i>Treas. Reg. § 1.61-6</i> . . . . .	986
	<i>Treas. Reg. § 1.61-8</i> . . . . .	987
	<i>I.R.C. § 1221</i> . . . . .	987
	<i>I.R.C. § 1231</i> . . . . .	988
	Questions . . . . .	989
	<i>William M. Bailey v. Commissioner of Internal Revenue</i> . . . . .	990
	Questions . . . . .	994
	<i>Gable v. Commissioner of Internal Revenue</i> . . . . .	994
	Questions . . . . .	998
	Case Notes . . . . .	999
8.6	SALE OR EXCHANGE BY THE PATENT HOLDER . . . . .	1000
	<i>I.R.C. § 1235</i> . . . . .	1001
	<i>Treas. Reg. § 1.1235-1</i> . . . . .	1001
	<i>Treas. Reg. § 1.1235-2</i> . . . . .	1003
	Questions . . . . .	1006

---

**TABLE OF CONTENTS**

	<i>Busse v. United States</i> .....	1006
	Questions .....	1013
	<i>McClain v. Commissioner of Internal Revenue</i> .....	1013
	Questions .....	1019
	Internal Revenue Service Technical Advice Memorandum .....	1020
	Questions .....	1024
	Case Notes .....	1024
<b>Chapter 9</b>	<b>U.S. TECHNOLOGY EXPORT CONTROLS .....</b>	<b>1027</b>
9.1	OVERVIEW OF EXPORT CONTROL SYSTEM .....	1028
	15 C.F.R. Part 732 .....	1028
	Questions .....	1037
	15 C.F.R. Part 736 .....	1037
	Questions .....	1042
	15 C.F.R. Part 738 .....	1043
	Questions .....	1051
	15 C.F.R. Part 740 .....	1051
	Questions .....	1057
	15 C.F.R. Part 762 .....	1058
	Case Notes .....	1062
9.2	DEEMED EXPORTS .....	1063
	15 C.F.R. Part 734 .....	1063
	Questions .....	1065
	Case Notes .....	1067
	<i>U.S. v. Roth</i> .....	1069
	Questions .....	1077
9.3	SELECTED EXPORT CONTROLS .....	1078
9.3.1	Encryption Technology .....	1078
	15 C.F.R. Part 772 .....	1079
	Questions .....	1080
	15 C.F.R. Part 742 .....	1080
	Questions .....	1082
	15 C.F.R. Part 740 .....	1083
	Questions .....	1084
	<i>Junger v. Daley</i> .....	1084
	Questions .....	1088
9.3.2	Software Programs .....	1089
	15 C.F.R. § 740.6 .....	1089
	Questions .....	1091
	15 C.F.R. § 740.13 .....	1091
	Questions .....	1094

---

**TABLE OF CONTENTS**

	Case Notes . . . . .	1095
9.4	SELECTED RECENT ENFORCEMENT CASES . . . . .	1096
<b>Chapter 10</b>	<b>BUSINESS ORGANIZATIONS AND MANAGEMENT RESPONSIBILITIES . . . . .</b>	<b>1107</b>
10.1	CHOICE OF BUSINESS ORGANIZATION . . . . .	1107
10.1.1	Limited Partnership . . . . .	1108
10.1.2	Subchapter C Corporation . . . . .	1110
10.1.3	Subchapter S Corporation . . . . .	1113
10.1.4	Limited Liability Company . . . . .	1114
10.1.5	Comparison of Corporations and Limited Liability Companies . . . . .	1115
10.2	MANAGEMENT RESPONSIBILITIES . . . . .	1116
10.2.1	Directors' Fiduciary Duties . . . . .	1117
	<i>Weiss v. Swanson</i> . . . . .	1117
	Questions . . . . .	1121
	Case Notes . . . . .	1122
10.2.2	Officers' Fiduciary Duties . . . . .	1124
	<i>Wahlcometroflex, Inc. v. Baldwin</i> . . . . .	1125
	Questions . . . . .	1128
	Case Notes . . . . .	1129
10.2.3	Majority Shareholders' Fiduciary Duties . . . . .	1131
	<i>Pointer v. Castellani</i> . . . . .	1131
	Questions . . . . .	1140
	Case Notes . . . . .	1140
10.2.4	Shareholder Direct and Derivative Suits . . . . .	1143
	<i>Metcoff v. Lebovics</i> . . . . .	1144
	Questions . . . . .	1151
	<i>Matter of Converse Tech., Inc. Derivative Litig.</i> . . . . .	1152
	Questions . . . . .	1158
	Case Notes . . . . .	1159
10.2.5	Usurpation of Corporate Opportunities . . . . .	1161
	<i>Telxon Corp. v. Meyerson</i> . . . . .	1161
	Questions . . . . .	1168
	Case Notes . . . . .	1168
10.2.6	Piercing The Corporate Veil . . . . .	1170
	<i>McCallum Family L.L.C. v. Winger</i> . . . . .	1170
	Questions . . . . .	1178
	Case Notes . . . . .	1178

---

**TABLE OF CONTENTS**

<b>Chapter 11</b>	<b>FINANCING TECHNOLOGY INNOVATION . . . . .</b>	<b>1181</b>
11.1	SMALL BUSINESS INNOVATION RESEARCH (SBIR) AND SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PROGRAMS . . . . .	1182
11.1.1	Overview of SBIR and STTR Programs . . . . .	1182
11.1.2	Federal Legislation . . . . .	1183
	Small Business Innovation Development Act . . . . .	1184
	Questions . . . . .	1194
11.1.3	SBA SBIR Policy Directive . . . . .	1195
	SBIR Policy Directive . . . . .	1195
	Questions . . . . .	1207
11.1.4	SBA STTR Policy Directive . . . . .	1208
	STTR Policy Directive . . . . .	1209
	QUESTION . . . . .	1210
11.1.5	SBIR Data Rights and Phase III Rights . . . . .	1210
	<i>Night Vision Corp. v. The United States</i> . . . . .	1210
	Questions . . . . .	1223
	Case Note . . . . .	1223
11.2	PRIVATE SECURITIES OFFERINGS . . . . .	1224
11.2.1	Founders, Family and Friends . . . . .	1225
11.2.2	Angel Investors . . . . .	1226
	Case Notes . . . . .	1226
11.2.3	Securities Registration Exemptions . . . . .	1228
	<i>Q&amp;A: Small Business and the SEC</i> . . . . .	1228
	Notes . . . . .	1234
	Questions . . . . .	1235
	Case Notes . . . . .	1235
11.2.4	Private Placement Memorandum . . . . .	1237
	Case Notes . . . . .	1239
11.3	FRAUD IN PRIVATE SECURITIES OFFERINGS . . . . .	1241
	<i>Ohio Bureau of Workers' Compensation v. MDL Active Duration Fund, Ltd.</i> . . . . .	1241
	Questions . . . . .	1245
	<i>H-M Wexford LLC v. Encorp, Inc.</i> . . . . .	1246
	Questions . . . . .	1254
	Case Notes . . . . .	1254
11.4	VENTURE CAPITAL INVESTMENTS . . . . .	1256
11.4.1	Venture Capital Industry . . . . .	1257
	Size and Structure of the Venture Capital Market . . . . .	1257
11.4.2	Structuring A Venture Capital Investment . . . . .	1260
	Primer on Stocks and Bonds . . . . .	1260
	Key Issues in Venture Capital Investments . . . . .	1261

---

**TABLE OF CONTENTS**

11.4.3 Sample Venture Capital Term Sheet . . . . . 1267

11.4.4 Venture Capital Investment Disputes . . . . . 1282

*Spencer Trask Software v. Rpost International* . . . . . 1282

Questions . . . . . 1291

*Infosage v. Mellon Ventures* . . . . . 1292

Questions . . . . . 1299

Case Notes . . . . . 1299

11.4.5 Glossary of Selected Private Equity Investment Terms . . . . . 1302

Private Equity Glossary . . . . . 1302

11.5 OTHER FORMS OF FINANCING . . . . . 1317

11.5.1 Bank Loans . . . . . 1318

11.5.2 Monetization of Intellectual Property . . . . . 1321

11.5.3 Securitization of Intellectual Property . . . . . 1323

11.5.4 Letters of Credit . . . . . 1325

11.6 INITIAL PUBLIC OFFERINGS (IPOS) . . . . . 1327

11.6.1 Overview of IPO Process . . . . . 1327

11.6.2 Securities Acts . . . . . 1331

Q&A: Small Business and the SEC . . . . . 1331

11.6.3 Securities Registration . . . . . 1338

11.7 FRAUD IN PUBLIC SECURITIES OFFERINGS . . . . . 1379

11.7.1 Federal Securities Fraud . . . . . 1379

*In re Stac Electronics Securities Litigation* . . . . . 1380

Questions . . . . . 1388

Case Notes . . . . . 1389

11.7.2 State Securities Fraud . . . . . 1392

*Reardon v. Lightpath Technologies* . . . . . 1392

Questions . . . . . 1398

Case Notes . . . . . 1399

11.8 DUE DILIGENCE . . . . . 1401

11.8.1 Due Diligence Under Federal Securities Law . . . . . 1401

*Software Toolworks v. Painewebber* . . . . . 1402

Questions . . . . . 1409

Case Notes . . . . . 1409

11.8.2 Due Diligence Under State Securities Law . . . . . 1411

*Summers v. Welltech* . . . . . 1411

Questions . . . . . 1416

Case Notes . . . . . 1416

---

**APPENDIX . . . . . 1419**

PSA-X Valuation Exercise . . . . . 1419

BioFilter Negotiation and Drafting Exercises . . . . . 1422

---

*TABLE OF CONTENTS*

BioFilter Facts .....	1422
BioFilter Venture Capital Investment Exercise .....	1427
BioFilter License Agreement Exercise .....	1429
<b>TABLE OF CASES .....</b>	<b>TC-1</b>
<b>INDEX .....</b>	<b>I-1</b>