



**New Jersey
Cannabis Training
Program Catalogue
New Jersey
2022**

PREMIUM

420  **Organics**

CANNABIS





Table of Contents

1	Introduction.....	3
1.1	New Jersey Cannabis Regulatory Commission Rules	3
1.2	420 Organics.....	4
	Cannabis Training Program	6
1.3	Instructors.....	6
	Anna Schwabe PhD.....	6
	Grant Orvis, PhD	7
	Andrew Defries, PhD	8
	Wendi Young.....	8
1.4	Training Program Overview.....	9
1.5	Program Learning Objectives.....	10
1.6	Program Specific Objectives	11
1.7	Subject Details & Learning Goals	12
1.7.1	The Cannabis Plant	12
1.7.2	History and Taxonomy of Cannabis.....	13
1.7.3	Science and Public Perspectives.....	14
2.5.4	Phenotypes	15
2.5.5	Phytochemical Diversity.....	15
2.5.6	Testing Protocols & Methods	17
2.5.7	Cultivars & Strains.....	18
2.5.8	Breeding and Cultivation	20
2.5.9	Processing and Manufacturing Products.....	21
2.5.10	Packaging, Labeling, and Advertising	22
2.5.11	Medical and Pharmacological Applications	22
2.5.12	Public & Personal Health Risks	24
2.5.13	Legislation and Policy	25
2.6	Expected Time Commitment for Completion	27



Cannabis Training Course Program

1 Introduction

The New Jersey Cannabis Regulatory Commission (CRC) issued the Personal Use Cannabis Rules in August of 2021 and included in those rules is a requirement that each person entering the Cannabis Industry in New Jersey must fulfil to obtain a Cannabis Business Identification Card which is required to operate within the industry. This rule requires each person to complete a training or education program which covers specific topics which they outline in the rules. Additionally, in order to maintain the Cannabis Business Identification Card, each person must complete an additional eight (8) hours of continuing education related to the Cannabis industry in New Jersey.

420 Organics has a team of PhD level *Cannabis* educators who are experts in various fields of the Cannabis industry who have developed a training program that is tailored to the CRC education requirements and covers all the topics outlined in the rules.

1.1 New Jersey Cannabis Regulatory Commission Rules

The Personal Use Cannabis Rules Special Adopted New Rules: N.J.A.C. 17:30 Adopted: August 19, 2021, by New Jersey Cannabis Regulatory Commission under SUBCHAPTER 8: CANNABIS BUSINESS IDENTIFICATION CARDS, § 17:30-8.1 COMMISSION ISSUANCE OF CANNABIS BUSINESS IDENTIFICATION CARDS:

Every owner, principal, management services contractor, employee or volunteer of a cannabis business license-holder or a testing laboratory that accesses the premises of a cannabis business or handles cannabis on behalf of a license-holder or testing laboratory and every cannabis handler pursuant to paragraph shall be required to register with the Commission and be issued a Cannabis Business Identification Card. As part of the registration, a person requesting a Cannabis Business Identification Card must complete



a training course that has been approved by the Commission and provides education including but not limited to the following topics:

- i. History of cannabis use, prohibition, and legalization
- ii. Common cultivation techniques and strain/cultivar varieties
- iii. Chemotypes of cannabis
- iv. Packaging, labeling, and advertising
- v. Cultivation and manufacturing processes
- vi. Health education, risks of cannabis use and over-use, and cannabis dependency
- vii. The medical use of cannabis
- viii. Laws and regulations pertaining to cannabis

1.2 420 Organics

420 Organics is a New Jersey Agritech company that is female owned, and locally operated, currently cultivating federally compliant *Cannabis sativa* L. (hemp). We deploy the most sustainable cultivating technology available today, and are the first true USDA certified organic, 100% pesticide free, food grade hemp facility in New Jersey. We utilize a semi-closed loop eco-system that combines both aquaculture and hydroponics, supporting the plant growth without the need for chemical nutrients which conserves water and does not use nutrient salts. This method has higher yields in less time due to the nutrient rich water in the system.

Sharing our experience and knowledge is an integral part of our community vision. The leaders of 420 Organics have developed an extensive Cannabis Training Program available to all working in the cannabis field and the public who are interested in learning about this growing industry. Dr. Anna Schwabe, the Director of Research and Development for 420 Organics, is a researcher and educator spearheading the creation of this course catalogue. The materials are organized to exceed the requirements of the New Jersey Cannabis Regulatory Commission guidelines when the entire series is completed.



Our series will cover all of the topics listed in the Personal Use Rules and Regulations Administrative Code 17: 30-8.1. It is our hope this program will be NJ Cannabis Certified and 420 Organics will be an approved third-party vendor to provide the state mandated training in the future. For those not needing the to attain the Cannabis Business card in NJ, ala carte sections are available. The material shared in this course catalog and by our panel of cannabis experts is driven from peer reviewed research, scientific evidence, and decades of field experience.





Cannabis Training Program

1.3 Instructors

Anna Schwabe PhD



Genetics, Evolutionary & Conservation Biology, Biological Education
Director of R&D and Director of Education at 420 Organics

Dr. Anna Schwabe's expertise is specifically *Cannabis* Science and Education. She is especially passionate about facilitating consistency and bringing an elevated level of education to the *Cannabis* industry. She has extensive experience in *Cannabis* genetics and her education spans a variety of scientific fields. She holds a B.S. (Cellular & Molecular Biology), an M.S. (Biological Sciences, Plant Population Genetics) and Ph.D. (Biological Education and *Cannabis* Genetics) from the University of Northern Colorado and was awarded both the Dean's Citation of Excellence and The Dean's Award for Outstanding Dissertation for her doctoral research titled "*A multifaceted approach to investigate genetic aspects in Cannabis sativa*". She is an established presenter and invited speaker in the *Cannabis* industry and has published several peer reviewed research articles on her *Cannabis* research. She is an Associate Professor at the University of Colorado where she co-teaches "Modern Cannabis Science" through the Continuing Education Program in the Ecology and Evolutionary Biology Department. She is Affiliated Faculty at the University of Northern Colorado where she taught Genetics and Conservation Biology and serves as a research mentor and student advisor. She is also a *Cannabis* educator through the Curious About Cannabis Program.

Undergraduate Colorado State University, Anatomy & Physiology

B.S. University of Northern Colorado, Cellular & Molecular Biology

M.S. University of Northern Colorado, Biological Sciences, Plant Population Genetics

Ph.D. University of Northern Colorado, Biological Education and *Cannabis* Genetics

"A multifaceted approach to investigate genetic aspects in Cannabis sativa"

Dean's Citation of Excellence, and Dean's Award for Outstanding Dissertation



Grant Orvis, PhD



Geneticist, developmental biologist, and industry expert
Founder of BoCo Farms

Dr. Grant Orvis has been involved in the *Cannabis* industry for over a decade. He has consulted for both the hemp and marijuana industries, specializing in genetics, breeding and everything from seed to sale. He has served as the Director of Cultivation & Chief Technical Advisor for both indoor & outdoor cannabis production, and has been responsible for writing, developing, creating and/or implementing SOPs, breeding programs and internal audits. He has led & set up cultivations, served as an expert witness, ensured client compliance, solved problems, and connected businesses as an integration tool for success. Additionally, he has experience with nutrient programs, integrated pest management programs, research & development programs, and has performed services for farmers, breeders, processors, manufacturers, and retailers. He has testified before legislative committees on numerous bills, worked with stakeholders and legislators on bill language and participated in several rule making and stakeholder workgroups regarding hemp and marijuana. His institutional research and funding opportunities combined with his work through the Industrial Hemp Research Foundation offers an excellent understanding of the research practices and funding strategies at Institutions of Higher Education.

B.S. Arizona State University, Zoology & Developmental Biology and Embryology

Ph.D. University of Texas (Houston), Molecular Genetics & Reproductive Biology

Postdoc: Sloan-Kettering Cancer Center (NYC), Molecular Genetics



Andrew Defries, PhD



Botanical Chemist

Founder/owner SevenRitual

Dr. Andrew Defries is a botanist and chemist with interdisciplinary skills in plant genomic sciences, chemistry, and cheminformatics.

He has experience setting up scientific laboratories for *Cannabis* quality control and large cultivation operations. His passion and focus are phytochemicals and extraction techniques. He is described as a lifelong learner with equal parts tenacity, creativity, and gusto.

B.S. University of Toronto, Zoology, Endocrinology, Genetics

Ph.D. University of California (Riverside), Chemical Genetics, Botany, Organic Chemistry, Proteomics, Genetics

<http://tinyurl.com/AndrewGoogleScholar>

Wendi Young



Analytical Chemist

Founder & President of Triverity Laboratories

Wendi Young is an analytical chemist with experience in product development, regulatory and compliance in the food, pharmaceutical and cannabis industries. She founded Triverity Laboratories to support people in the cannabinoid industries in the U.S and Europe. Her goal is to achieve the highest levels of global regulatory testing and compliance for *Cannabis* and cannabis products. She is committed to maintaining best-in-class standards of product testing across their global network of ISO 17025-accredited laboratories and strives to keep fully abreast of the ever-changing CBD regulatory landscape. Her laboratories employ leading analytical methodology and maintain



operational transparency, that always seek to deliver data and consultancy that is accurate, impartial, and fit for purpose.

B.S. Chemistry, University of Northern Colorado

1.4 Training Program Overview

The New Jersey Training Program has 13 Core Units which cover basic information that personnel in the New Jersey Cannabis Industry should have.

1. The *Cannabis* Plant
2. The History & Taxonomy
3. Science and Public Perspectives
4. Phenotypes
5. Phytochemical Diversity
6. Testing Protocols & Methods
7. Cultivars & Strains
8. Breeding & Cultivation
9. Processing & Manufacturing
10. Packaging, Labeling, & Advertising
11. Medicinal & Pharmacological Applications
12. Public & Personal Health Concerns
13. Legislation & Policy

Each topic is covered over a series of recorded PowerPoint lectures, and a pdf of the slides with space for notetaking is provided to download. Additionally, links to references and instructions for retrieving articles are provided as necessary.

In order to successfully complete the program and receive the Cannabis Program Certification, a total average of 80% on the assessments must be achieved. Participants who fall short may retake assessments with a low score. Participants who receive an overall average lower than a 60% must retake the program. There will be a comprehensive



assessment given for each of the 13 core units, which will cover the information in each of the subunits, which are detailed in section [2.5](#). The number of questions for the assessments in each lesson varies as there is more material to learn in some subjects than others.

1.5 Program Learning Objectives

The overarching goal of the course is to give individuals working in the cannabis industry the knowledge and background they will need to navigate the cannabis industry space effectively and legally in New Jersey. In this course, individuals will gain a deep understanding about the history of *Cannabis* and the events leading up to and including the current state of the *Cannabis* plant, products, and industry. We will work to dispel myths and misinformation that is rampant throughout all arms of the industry and aim to comprehensively educate all who will be involved in the cannabis industry in New Jersey. This course will serve as the gold standard for *Cannabis* education throughout New Jersey. Upon completion of the course, individuals should have a high level of knowledge spanning multiple fields in the cannabis space that will prepare them for industry positions including cultivation, manufacturing, production, retail, and current and changing policies and legal aspects. Individuals should be able to effectively describe and communicate various aspects of *Cannabis* including the plant, history, scientific/public perceptions, phenotypes, phytochemistry, testing methods, cultivation, processing, products, pharmacological applications, health risks, legislation, and policies.

1. Understand requirements for regulatory compliance for all facets of the industry including cultivation, processing, manufacturing, distribution, and retail of *Cannabis* plants and products.
2. Explain and discuss the history of *Cannabis* including evolution, cultivation, uses, prohibition, and scientific milestones.



3. Review and assess the current risks and benefits in the cannabis industry including cultivation, breeding and identification, regulatory compliance, pest and pathogen management, processing, testing, distribution, and consumption.

1.6 Program Specific Objectives

1. Define and describe the *Cannabis* plant anatomy and physiology, breeding system, and propagation methods.
2. Explain current theories of the evolutionary history, dispersal, and distribution of *Cannabis*.
3. Describe how genotype drives phenotype, how environmental factors contribute to the phenotype, and how this information can be applied to the *Cannabis* industry.
4. Recognize the gap between naming conventions used in the *Cannabis* industry and the scientific terminology.
5. Describe what a phenotype is, explain contributions that shape a phenotype, and how to control variables to create consistent phenotypes.
6. Describe the phytochemical components of *Cannabis* and identify the major phytochemicals produced in cannabis as well as degradation and decarboxylated compounds of interest produced post-harvest.
7. Analyze testing results and review testing protocols and methods for accuracy and understand the potential issues surrounding different methodologies and procedures.
8. Discuss the differences between cultivars and strains and how these are used in the *Cannabis* industry.
9. Summarize how *Cannabis* breeding is conducted, including feminizing seeds, stabilizing genetics, and sex reversal methods, and describe the different methods of propagation including seeds, clones, and tissue culture.
10. Recall the methods used for processing and manufacturing *Cannabis* products.
11. Explain the requirements for packaging, labeling, and advertising *Cannabis* products.
12. Identify the medicinal and pharmacological applications for cannabinoids and terpenes, and the therapeutic potential as well as past, current, and future research into medicinal *Cannabis*.



13. Evaluate the public health risks and assess whether accessibility will impact use and misuse among various demographic groups.
14. Interpret current legislation, rules and policy related to cultivation, processing, manufacturing, distribution, retail, possession and consumption of *Cannabis* and cannabis products.

1.7 Subject Details & Learning Goals

1.7.1 The Cannabis Plant

Cannabis sativa L. is one of the most fascinating and yet demonized plants in the world. Throughout the extensive relationship between humans and *Cannabis*, it has been cultivated and selected for various uses. Wide applications include every part of the plant from seed, fiber, and roots to the oils and other unique phytochemicals it produces. This section is broken down into three subjects covering the *Cannabis* plant

1. **Plant Basics:** Covers some *Cannabis* plant basics on which to build knowledge.
2. **Physiology & Anatomy:** Covers a little plant evolution as well as plant cells and tissues, the role of hormones in *Cannabis* development, the parts of male and female *Cannabis* flowers, and the seeds, leaves, stems, and roots.
3. **Life Cycle:** Covers the basic life cycle of the *Cannabis* plants, from the seed and germination, through the vegetative stage, and finally the flowering stage.

Learning Goals

- Describe the difference between hemp and marijuana.
- Identify the major phytochemicals in *Cannabis* and describe whole flower and various types of extracts.
- Understand and recognize the anatomy of plants and the structure and function of the parts of male and female flowers.
- Describe and identify in detail features that are unique in *Cannabis* anatomy including the breeding system and methods of propagation.



- Understand and describe the different stages of the life cycle of *Cannabis* from seed to fruit.

1.7.2 History and Taxonomy of Cannabis

Have you ever wondered why such an incredibly versatile plant is listed as an illegal drug in almost every country around the world? How is it that this incredibly important economic crop used for food, fuel, fiber, fun, and pharmaceuticals ended up on the wrong side of the law? Join us as we trace back through the history of *Cannabis* broken down into three subjects.

1. **Ancient to Modern History:** Covers the timeline of *Cannabis* use throughout history.
2. **Evolution & Taxonomy:** *Cannabis* can be found all over the world, but where and when did *Cannabis* originate? What other plants are closely related to *Cannabis*? How many species of *Cannabis* are there? These questions and more are answered as we dive into *Cannabis* evolution and taxonomy.
3. **Species:** There is debate about whether there are one, two, or three species of *Cannabis*. In order to understand why experts don't agree, we must first understand what a species is (spoiler alert: experts don't agree on how to classify species). This lesson covers what defines a species and how we can apply those concepts to proposed *Cannabis* species and subspecies.

Learning Goals

- Describe ancient and modern uses for *Cannabis* and the versatility of hemp.
- Describe the history of prohibition and the events that led up to it in the U.S.
- Understand the complex taxonomic history of *Cannabis* and various proposed descriptions of subspecies and varieties.
- Describe and discuss the evolutionary history of *Cannabis* and closely related genera.



- Have a basic understanding of the historical taxonomic confusion with *Cannabis*.
- *Cannabis* taxonomy: family, genus, species, subspecies, cultivar, strain.

1.7.3 Science and Public Perspectives

Scientists strive to uncover questions surrounding *Cannabis* and bring that information to the public, but sometimes what the research shows and the interpretation by the public can lead to a disconnect between the two. What are the scientific aspects that continue to create confusion among members of the community and within the industry? What are the research interests and who are the notable researchers churning out answers to community questions?

1. **Scientific vs. Public Perspectives:** Covers scientific approaches to various aspects of *Cannabis*, and the begins to unravel the disconnect that exists with the well-established legacy growers, the *Cannabis* community, the industry, consumers, and the public.
2. **The Science Gap:** Addresses some common rifts between the use of terminology in *Cannabis* from the science and public perspectives, the importance of science communication, and the role science has in informing the public and policy makers.

Learning Goals

- Understand the rift between the public and scientific perception of *Cannabis*.
- Give examples of the difference in *Cannabis* terminology in common and scientific vernacular.
- Explain why it is difficult for scientists and the public to effectively communicate.
- Describe various ways scientific research can help us understand *Cannabis*.
- Understand the problem with terms used in different contexts in the same industry.
- Understand the connection between science and policy, and why we need science to drive legislative decisions as regulations change in the US and worldwide.



- Describe in detail how the “science gap” is perpetuated.
- Describe what is meant by “best available science”, and what is the problem with this in the *Cannabis* industry.

2.5.4 Phenotypes

A phenotype is the observable, physical characters that result from the expression of the genetic traits of an organism in a particular environment. What the plant looks like, smells like, and tastes like are all part of the phenotype. Phenotypes are influenced by the environment, which of particular importance in the Cannabis industry when striving for a consistent product. These lessons will help understanding the interaction between genotype and environment and how they work together to shape the outcome of a plant's phenotype.

- 1. Phenotype, Chemotype, & Genotype:** The elements that shape the physical properties, including the chemical profile of *Cannabis*, come from both the genotype and the environment. This lesson covers how the roles of genotype, phenotype, and the environment shape the different characteristics of *Cannabis* modern diversity.
- 2. Mutations:** Everybody loves a weirdo! Fasciation, leaf mutations, and polyploidy. What are the different types of mutations, and what types of mutations are found in *Cannabis*? This lesson covers different types of mutations, how they arise, and some mutations that can be found in *Cannabis*.
- 3. Pathogens, Pests, & Problems:** What is that white powdery stuff on my leaves? Why are my leaves yellow? There are some common pests and pathogens that affect *Cannabis*. Here we cover common insect pests, diseases and pathogens, and nutrient problems in *Cannabis* cultivation.

2.5.5 Phytochemical Diversity

Cannabis is a chemically complex plant with numerous natural chemical constituents. Although cannabinoids such as THC and CBD are the most widely known and



researched constituents of the *Cannabis* plant, other metabolites such as alkaloids, flavonoids, terpenoids, amino acids and others are also important. Varying levels and combinations of the chemical constituents results in unique and diverse chemical profiles.

1. ***Phytochemical Diversity Part 1:*** Plants make a wide variety of chemicals called secondary metabolites. These phytochemicals play important role in the lives of plants, largely because they can't move when conditions are less than favorable. This lesson is an introduction to *Cannabis* biochemistry and the biosynthetic pathways that allow the plant to manufacture the diverse phytochemicals found in *Cannabis*.
2. ***Phytochemical Diversity Part 2:*** *Cannabis* is a complex plant from which hundreds of phytochemicals have been isolated. In this lesson, Dr. Andrew Defries discusses details on the properties and chemical structures of some of the phytochemicals other than cannabinoids produced in the *Cannabis* plant, such as terpenes, flavonoids, and stilbenes.

Learning Goals

- Understand the difference between cannabinoids and terpenes and other constituents found in *Cannabis*.
- Understand the difference between primary and secondary metabolism.
- Describe the secondary metabolites in *Cannabis* and the potential reasons for the plant manufacturing these compounds.
- Explain in general the mechanism by which secondary metabolites are manufactured and what the major components are in the biochemical pathways for cannabinoids and terpenes.
- Explain the difference between acidic and neutral cannabinoids.
- List the various constituents that play a role in the sensory (aromatic) profile of different *Cannabis* strains.
- Define chemovar and explain why clones may express variable chemotypes.



2.5.6 Testing Protocols & Methods

Cannabis is a consumable product, and as such, testing is required for consumer safety. The required testing protocols and methods are detailed in these lessons and walks through the terms and definitions related to testing, the types of tests required, how those tests are conducted, as well as how to read a Certificate of Analysis generated from a testing laboratory.

- 1. Testing Protocols:** *Cannabis* is highly regulated and there is a myriad of expectations for testing and compliance to protect consumers. Testing for chemical composition, THC potency, microbial contamination, foreign material, residual pesticides, and heavy metals are conducted on representative batches of flower and lots of finished products. This lesson goes over terminology related to testing protocols, and what each of these tests show and why they are necessary.
- 2. Testing Methods:** Multiple tests on *Cannabis* and cannabis products are required to protect the health and safety of the consumer. Tests on cannabinoid potency and terpenes give the consumer information about the chemical profile, but other necessary tests such as those for contaminants such as heavy metals, microbes, mycotoxins, heavy metals, and pesticides are extremely important. This lesson goes over the testing requirements, the analytical methods used to generate results, method validation, and the basics of how to read a certificate of analysis (COA).

Learning Goals

- Describe the tests used for testing phytochemicals and understand why this information is important.
- Describe different sampling methods and the purpose and the function of testing labs.
- Understand the various testing methods (HPLC and GC-MS), the difference between them, and how to read chromatograms and Certificates of Analysis (COAs).



- Know the purpose of testing for mycotoxins, microbials, heavy metals, and other contaminants and acceptable levels of each in *Cannabis* samples, and why this information is necessary.
- Describe the process of method validation and relate that to precision and accuracy and understand the difference between these two terms.
- Describe how testing protocols are generated, interpret a COA, and list the requirements for *Cannabis* testing in New Jersey.
- Understand how and why shelf life and stability testing is performed and why this information is necessary.
- Describe the various certifications and accreditations that can be awarded to each arm of the *Cannabis* industry and how each is achieved.

2.5.7 Cultivars & Strains

The manner in which *Cannabis* is cultivated and bred is fairly unique and the use of terms such as strain and cultivar are a matter of debate. Here we look at the topics that have created some interesting discussions on how we should categorize and communicate about *Cannabis*, and where you can go to get information on the wide variety of *Cannabis* strains currently on the legal market.

1. **Variation & Quality:** How do we measure quality in *Cannabis*? What types of phytochemicals are present in *Cannabis* and how do they affect potency? This lesson covers the complexity & diversity of *Cannabis*, as well as factors that impact quality.
2. **Strains, Cultivars, & Varieties:** Have you ever referenced *Cannabis* "strains", only to have someone tell you strains are found in bacteria and viruses, and different types of *Cannabis* should be referred to as "cultivars"? In this lesson we go over the definitions of terms such as "cultivar" and "strain" and skim the surface of what a landrace *Cannabis* variety is.



3. **Categories & Communication:** How does someone who is unfamiliar with Cannabis make purchasing decisions? This lesson discusses the use of strain names and broad categories (sativa, indica, hybrid) and how these naming conventions serve as a basis for communication within the industry and among consumers.
4. **Strain Names:** How do you know that the flower you purchased is what the label says it is? This lesson addresses how, where, and why names may be unreliable, and how this problem is not unique to the *Cannabis* industry.
5. **“Research Grade Marijuana”:** You may have heard the *Cannabis* provided for research in the U.S. is not like the *Cannabis* available at retail dispensaries. This lesson discusses the differences between the *Cannabis* grown for research purposes at the University of Mississippi and the *Cannabis* available on the legal market in the United States.
6. **Strain Information & Databases:** How many strains are there, and how do I find information on specific strains I am interested in? This lesson goes over the various places to find information on described *Cannabis* strains, and what type of information you can find in some of the commonly used databases.

Learning Goals

- Define the ways and know the difference in how domesticated/cultivated plants are categorized (cultivar, strain, variety chemovar).
- Be able to explain the different methods used to categorize *Cannabis* and the pros and cons of each.
- Understand and explain the various sources of the misnaming problem in *Cannabis*.
- Describe the traits used to classify *Cannabis* and how they relate (or not) to one another.
- Understand and be able to explain the equation phenotype = environment + genotype, how it relates to *Cannabis*, and the implication it has in the industry.



- Define what NIDA (National Institute on Drug Abuse) and explain their role in the industry, and the difference and implications of research grade marijuana compared to legally available retail marijuana.

2.5.8 Breeding and Cultivation

Cultivating and breeding *Cannabis* is a lucrative and legitimate business in areas where the plant is legal. There are many different methods to propagate and cultivate *Cannabis*, and breeding techniques are not as easy as pollinating and growing seeds. Methodologies for cultivation result from a combination of prohibition and the unique breeding system in the majority of *Cannabis* where male and female flowers are housed in separate plants.

- 1. Cultivation:** This lesson covers the very basics of cultivation such as growth media, cultivation methods, propagation methods, high and low stress training techniques, and touches on common nutrients, pathogens, and pests, and finally offers a word on pesticides and pest control.
- 2. Genetics & Breeding:** This lesson goes over the basic genetic principle of “genetic drift” and why it doesn’t apply to cultivated *Cannabis*, and then goes into cross-pollination, pheno-hunting, Mendelian inheritance, feminizing seeds, breeding goals and methods, and the development of polyploids.
- 3. Intellectual Property:** This lesson covers how do *Cannabis* breeders can protect their intellectual property and register new varieties. It includes information on the requirements to register new plant varieties and the process for registration, as well as plant patents and other types of protection for products in the *Cannabis* industry that fall under intellectual property.

Learning Goals

- Describe what breeding entails and the purpose.
- Describe evolution and the process of evolution, how it is measured, and how it occurs.



- Compare the difference between natural selection and genetic drift, and the relative impacts on populations.
- List and describe the three conditions that must be met for selection to act.
- Explain how is breeding and artificial selection differ from evolution and natural selection.
- Define marker-assisted selection and the role it has in the *Cannabis* industry.
- Describe *Cannabis* breeding techniques, what traits in *Cannabis* are of interest to breeders, and the pros and cons of these methods.
- Discuss traditional versus modern breeding techniques in *Cannabis*.
- Describe the types of protections available to plant breeders, and how and why they may be different for some *Cannabis* plants.
- List the requirements to register new plant varieties and the process for registration.
- Describe the types of products other than plants that might be considered for patents under intellectual property.

2.5.9 Processing and Manufacturing Products

Processing & Manufacturing: In a booming industry, many entrepreneurs are interested in creating new and unique *Cannabis* products. What are the rules for processing and manufacturing? Although this lesson goes over the specific procedures, requirements, & restrictions in New Jersey, it will give a solid base of information for those seeking information about processing and manufacturing *Cannabis* flower and *Cannabis* products.

Learning Goals

- Outline the various processing methods that *Cannabis* and the products including extracts, isolates, concentrates, and be able to define broad and full spectrum products.



- Describe the various finished products and formulations on the legal market. For example, flower, tinctures, oils, edibles, vape pens, salves, patches, beverages etc.
- Explain the product preferences for the broad categories of products and the revenue generated from each in the industry.
- List the methods used to manufacture and formulate the major products on the legal market and the certifications and accreditations that should be sought after to be a compliant and responsible business.

2.5.10 Packaging, Labeling, and Advertising

Packaging, Labeling, & Advertising: How should I package my Cannabis product? What are the requirements for the labeling? Can I hire a mascot to drive traffic to my dispensary? This lesson details the procedures, requirements and restrictions for packaging, labeling, & advertising *Cannabis* flower and products in New Jersey specifically, but provides a solid base for anyone seeking information on cannabis packaging, labeling, & advertising.

Learning Goals

- List the packaging and labeling requirements for *Cannabis* products in New Jersey.
- Describe the potential avenues for advertising cannabis products, and what types of advertising is prohibited.
- Explain the reasons for the packaging and labeling requirements.

2.5.11 Medical and Pharmacological Applications

As interest in *Cannabis* research for medicinal applications and therapies grows, more and more people are interested the benefits of medicinal cannabis and the pharmaceuticals that have been developed using *Cannabis* derived compounds. Here we



cover at how *Cannabis* compounds work in the body and why they have such a broad range of therapeutic applications.

- 1. *The Endocannabinoid System:*** We knew about phytocannabinoids before the discovery of the Endocannabinoid System and our own endogenous cannabinoids. Why would these molecules from plants affect us? It was an inevitable, impressive, and important cascade of discoveries! This lesson covers the basics of the endocannabinoid system, different kinds of cannabinoids, and how endocannabinoid tone relates to health and homeostasis in the body.
- 2. *Medical Cannabis & Pharmaceuticals:*** This lesson covers the basics of plant & herbal medicine, the entourage effect (aka synergistic or ensemble effect), as well as approved *Cannabis* derived drug formulations and their applications.
- 3. *Cannabinoids & Pharmacological Applications:*** This lesson covers the major cannabinoids, some of the common minor cannabinoids, the differences in the chemical structure, pharmacological properties, and potential medical and therapeutic applications.
- 4. *Minor Cannabinoid Products:*** Minor cannabinoids are making a big splash on the scene, but what products are available, how are they made and are they safe to consume? This lesson covers some of the products containing minor cannabinoids currently available on the market.
- 5. *Routes of Administration:*** Which *Cannabis* product is right for me? Do I have to smoke it? What is the fastest acting product? This lesson covers different routes of administration, consumption methods, how cannabinoids get into the blood stream, and the basics of how metabolism and elimination of cannabinoids in the body changes over time.

Learning Goals

- List the different types of cannabinoids (endogenous, phytocannabinoids, and synthetic cannabinoids).
- Describe how cannabinoids interact with CB receptors.



- Explain the role of the endocannabinoid system.
- Outline the main cannabinoids and potential medical applications.
- List the approved cannabinoid drugs and describe for what they are prescribed.
- Describe what activation of cannabinoid receptors does in the body.
- Describe what “endocannabinoid tone” is, and what impacts it.
- Describe potential issues with cannabinoids that have not been well studied: cannabinoids other than THC and CBD.
- Outline the various routes of administration, relative times to peak concentration, as well as relative amounts reaching systemic circulation.
- Describe the first pass effect.
- Describe the physiological and metabolic differences between inhaling and ingesting THC.
- Appraise the FDA’s regulatory stance on CBD and other cannabinoids.

2.5.12 Public & Personal Health Risks

Public polls on *Cannabis* reform indicates Americans are in favor of legalization for medical use and a growing number support adult-use legalization. However, there are people who are wary of legalization and how that might impact both public health and the health of individuals consuming *Cannabis*. In these lessons we address some of the major concerns opposers of reform have and look at recent research and statistics as evidence for these claims.

- 1. Public Health Concerns:** A majority of Americans are in favor of *Cannabis* legalization, but research shows some people who oppose legalization are concerned that marijuana generally hurts society, is dangerous, leads to abuse and addiction, is a gateway to harder drugs, and is especially harmful to young people. This lesson covers some statistics found in various states following legalization and addresses the common concerns voiced by people who oppose the legalization of *Cannabis*.



2. Personal Health Concerns: Concerns of personal health risks related to *Cannabis* use have long since been of interest, and include impaired driving, brain changes that could affect learning and memory, mental illnesses involving depression, anxiety, suicidal thoughts and psychosis, schizophrenia, overdose, organ damage, and risks associated reproduction and pregnancy. Here we address some of the topics surrounding personal health risks of *Cannabis* use and looks at some of the scientific literature investigating these topics.

Learning Goals

- Assess the available research and determine the public health risks of *Cannabis* use in various demographics.
- Discuss the arguments for and against legalization of adult use *Cannabis*.
- Describe how *Cannabis* use impacts cognitive function, motor function, and memory.
- Explain the risks of teenagers consuming *Cannabis*.
- Compare how legalization in several states has impacted alcohol and opioid addiction.
- Discuss crime, vehicular accidents, hospitalizations, and arrests have changed in states where adult use *Cannabis* is legal.

2.5.13 Legislation and Policy

Cannabis legislation and policy has changed over the past decade, especially in the U.S where more than half of the states allow medical *Cannabis* use and many also allow adult-use. However, *Cannabis* has and continues to be largely prohibited throughout the world, with only a few countries allowing *Cannabis* use, even for medical purposes. In these lectures we look at the relatively recent global prohibition of *Cannabis* and how things have changed in recent years. In this section, we will also cover the regulatory agencies reaching into different areas of *Cannabis* cultivation and use.

- 1. International & U.S. Regulation & Policy:** What is the current state of the world and the U.S. when it comes to *Cannabis* legislation and policy, and



how did we get here? Join Dr. Grant Orvis as he walks through some of the international treaties and policies related to *Cannabis* (hemp and marijuana) regulations on an international level as well as in the U.S.

2. **Regulatory Agencies:** There are multiple agencies that are responsible for *Cannabis* regulation. Hemp is an agricultural commodity in terms of grain and fiber, but the definition of hemp means that it can also be grown for flowers rich in cannabinoids and terpenes as long as the flowers have no more than 0.3% THC. Also, CBD from *Cannabis* is an approved pharmaceutical drug ingredient. This has created a complex situation in the US where multiple agencies are stepping on each other's toes when it comes to regulation of the *Cannabis* plant and the products that are made with it.
3. **New Jersey Rules & Regulations:** This lesson covers the rules and regulations for New Jersey and includes topics such as applications, conditional licenses, classes of licenses, considerations, recordkeeping and standard operating procedures, and compliance testing. This is New Jersey specific information where details are covered in depth in other sections of the program (ex: [here](#), [here](#), and [here](#))

Learning Goals

- Compare and contrast worldwide and U.S. policy in relation to *Cannabis*.
- Summarize the purpose of the Single Convention of Narcotic Drugs 1961 and how they define illegal *Cannabis* (not hemp).
- Compare and contrast the Scheduling of *Cannabis* narcotics under the Single Convention v. DEA Scheduling in the U.S.
- Recognize levels of drug enforcement vary among nations, and which nations are strict versus those that are more lenient.
- Discuss the various regulatory agencies in the U.S. who and understand the problems with regulating *Cannabis* among these different agencies.
- Describe the role of the Drug Enforcement Agency in the U.S.
- Describe the Controlled substances Act of 1970.



- Describe the role of the FDA in *Cannabis* regulation, what laws they are responsible to enforce, and the products they regulate.
- Describe the role of the Cannabis Regulatory Commission, the levels of *Cannabis* licenses, and conditional licenses.
- Explain what an SOP is and why these are important in a *Cannabis* business.
- Understand the testing rules in New Jersey and how sampling for *Cannabis* and *Cannabis* products is conducted.

2.6 Expected Time Commitment for Completion

This program was designed following the New Jersey Cannabis Regulatory Commission's requirements for education for persons entering the *Cannabis* industry. We have designed a set of lectures and assessments that cover all topics required by the CRC. The total lecture time for all the recorded lectures is about 12 hours, and the allotted time for assessments is about 10.5 hours.

The expectation is that for each hour spent listening and taking notes for the lectures, you will need to spend 1-3 hours studying the material. Depending on your level of knowledge in the various subjects and topics, you can expect to spend anywhere from **35 hours to 60 hours** to get through the material, study, and complete the assessments.

This course is essentially a traditional college semester's worth of material.

Topic	Lecture	Assessment
The <i>Cannabis</i> Plant	1:23:28	1:00:00
History & Taxonomy	0:49:53	0:45:00
Science & Public Perspectives	0:55:27	0:20:00
Phenotypes	1:24:33	0:50:00
Phytochemical Diversity	0:57:31	0:45:00
Testing Methods & Protocols	0:51:18	0:40:00



Cultivars & Strains	1:35:02	1:15:00
Cultivation & Breeding	1:01:22	1:00:00
Processing and Manufacturing	0:17:06	0:30:00
Packaging, Labeling, and Advertising	0:22:26	0:30:00
Medical & Pharmacological Applications	1:18:46	1:30:00
Health Concerns	0:58:50	0:55:00
Legislation & Policy	0:34:03	0:35:00
Total	12:29:45	10:35:00

