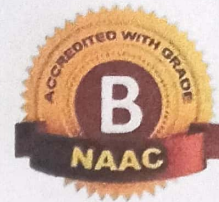




**GARGI EDUCATION INSTITUTE'S
GARGI AGRICULTURE RESEARCH AND
TRAINING INSTITUTE NASHIK.**



Asia's First Wine, Brewing and Alcohol Technology College

Affiliated to Savitribai Phule Pune University (Institute Id No. PU/NS/C/149/2009)

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ISO 9001:2015 Certified

2.6.1 - Programme and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students.

Course Outcomes, Programme Outcomes at UG/PG Level

Faculty of WBAT, Computer Science and Commerce

B.Sc. (Wine, Brewing and Alcohol Technology)

Statement of programme outcomes (PO)

By the of this programme, the students will be able to ;

PO1: Understand the contribution of various scientist in wine brewing and alcohol technology and scope of various branches.

PO2: Understand the concept of alcoholic beverage and their types

PO3: Understand the basic concept of yeast technology, fermentation technology and brewing technology.

PO4: Students absorb knowledge about diverse basic production steps in wine and beer Production.

PO5: Understand and explain various process of chemical Plant engg. And wine marketing

PO6: Explain and describe importance of health benefits of wine, by product and waste management.

PO7: Understand the fundamental concept of viticulture, biochemistry and sensory evaluation of wine, waste management and environmental awareness etc.

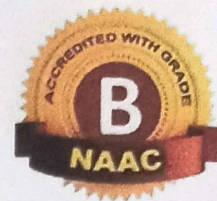
PO8: Students develop the skills to think independently plan wine fortification technique and execute it in different fields of wine technology especially the environment sustainability.

PO9: Students will acquire and demonstrate competency in laboratory techniques





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Semester-I

Course Outcomes:

Course code WBAT-111 basic microbiology papers-1

At the end of the courses, the students will be able to

CO1: Describe different structural parts and its arrangement of microbial cell.

CO2: Describe how microbiology developed and what the scope of the various is branches of the subject.

CO3: Understand the contribution of eminent scientist in the microbiology. CO4: Understand the ultra structure of bacterial cell.

CO5: Classify the bacteria on the basis of various parameters. CO6: Compare prokaryotic organism with eukaryotic organism.

Course code WBAT -112 Industrial Microbiology P-1

By the end of the course the students will be able to

CO1: Acquainting students with scope of industrial microbiology. CO2: Understand and learn various sterilization techniques.

CO3: Describe the nutritional requirement of bacteria.

CO4: This course acquaints students with various types of preservation technique. CO5: Understand and describe design and preparation of media.

CO6: Understand and describe filtration, disinfection and fumigation techniques. CO7: Familiarize historical development in fermentation industry

Course code WBAT -113 Introductions to Botany

At the end of courses the students will be able to .

CO1: Acquire knowledge on ultra structure of cell.

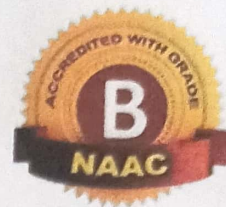
CO2: Understand the structure and chemical composition of chromatin and concept of cell division.

CO3: Interpret the Mendel s Principal, acquire knowledge on cytoplasmic inheritance and





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sex linked in hesitance.

CO5: Understand the fundamental concepts of plant anatomy.

CO6: Evaluate the structural organization of flowers and the process of pollination.

Course code WBAT-114 plant development and anatomy

At the end of courses the students will be able to

CO1: To gain knowledge of plant cells tissue and their functions.

CO2: Understand the process of microsporogenesis, megasporogenesis and double fertilization,

CO3: Enable to know the internal structure of stem, leaf and root in monocot and dicot.

CO4: Understand endosperm and its types and know the structures and development of monocot and dicot embryos.

CO5: Understand the meristematic tissue system. CO6: Understand the plant growth and their regulators.

Course code WBAT-115 Basic Biochemistry paper-1

At the end of courses the students will be able to-

CO1: Understand the role of biomolecule and their functions.

CO2: Understand and describe scope of biochemistry in the field of wine technology. CO3: Understand the structure and functions of biomolecules.

CO4: Understand the chemical structures of carbohydrate, lipid, their structural and metabolic role in callus system.

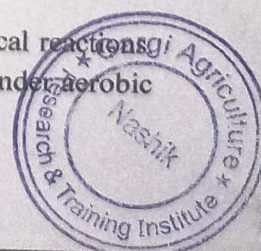
CO5: Understand the get practical knowledge of preparation of buffers and measurement of pH

CO6: Understand and describe classification of carbohydrate and lipid.

Course code WBAT -116 metabolic pathways paper-1

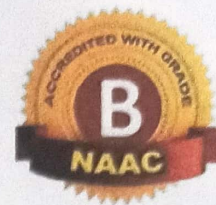
At the end of courses the students will be able to-

CO1: Understand the chemical bonding, strong and weak interactions and biological reactions
CO2: Understand the importance of electron transport chain, synthesis of ATP under aerobic and anaerobic conditions.





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CO3: To acquire knowledge related to TCA cycle in central carbon metabolism. CO4: Understand fundamentals of high energy bond and high energy compound.

CO5: To acquire knowledge to differentiate Exothermic reactions and Endothermic reactions.

CO6: Understand the concept of fermentation.

Course code WBAT -117 Basic Wine Technology:

At the end of courses the students will be able to-

CO1: Understand the concept of viticulture and their terminologies. CO2: Familiarize basic production step in white and red wine

CO3: Understand the classification of wine.

CO4: To acquire knowledge about grape vine and different grape varieties used in wine production

CO5: Understand the chemical constituents of wine. CO6: Understand role of oak barrel in wine.

Course code WBAT -118- Sensory Evaluation of wine Paper – I

At the end of courses the students will be able to-

CO1: Understand and gain knowledge about the basic taste, color and aroma of wine. CO2: Understand application of the aroma wheel and score card.

CO3: To acquire knowledge about the taste of the wine on basis of vision, smell and palate structure.

CO4: Understand and learn about the tasting room ,serving of wine. CO5: Understand the concept of Neurophysiologic mechanism of tasting. CO6: Understand the factors which influencing taste perception.





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Semester-II

Course code WBAT -121 – Basic Microbiology Paper-II

At the end of course the students will be able to-

CO1: Understand the basic of microscopy, their parts, working distance, resolving power, resolution, and magnification.

CO2: Understand the principal and application of bright field and dark field microscope. CO3: Understand the bacterial growth curve.

CO4: Understand and learn various staining technique.

CO5: Understand the properties and role of fixative, mordents, decolourizer and accentuates in staining.

CO6: Understand the difference between monochrome and differential staining, gram staining.

Course code WBAT-122 Industrial microbiology Papers- II

At the end of the courses the students will be able to-

CO1: Understand the basic components of typical fermentation medium. CO2: To acquire knowledge about the role of nutrients in microbial growth. CO3: Understand the concept of stock culture and its maintenance.

CO4: Understand the fermentation process and types of fermentation. CO5: Understand the concepts of up stream and downstream processing.

CO6: To acquire knowledge about the culture collection centres and their objective and working.

Course code WBAT -123 Plant Physiology.

At the end of the course the students will be able to-

CO1: Understand the concepts of transpiration and guttation.

CO2: Understand the relations between plant water and their metabolism.

CO3: Understand the concept of pathways translocation and source sink relationship





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CO4: Understand the plant and its interaction with surrounding, biotic & Abiotic components.

CO5: To acquire knowledge about metabolic changes during seed germination and fruit ripening.

CO6: Understand the response of plant to biotic stress and abiotic stresses

Course code WBAT-124 Applied Botany.

At the end of the course the students will be able to-

CO1: Understand the concept of plant propagation.

CO2: To acquire knowledge of various types of propagation like sexual propagation, vegetative propagation and artificial propagation.

CO3: Understand the concept of cell theory and callus totipotency. CO4: Understand the organ culture technique.

CO5: Understand the concept of embryo and endosperm culture. CO6: Understand the micro propagation and soma clonal variations.

Course Code WBAT-125 Basic Biochemistry Paper-II

At the end of the course the students will be able to-

CO1: Understand the classification of biomolecules, like Proteins. Enzymes, Nucleic acid and vitamins.

CO2: Understand the general properties of enzyme their activation and inhibition. CO3: Understand the general structure of DNA & RNA.

CO4: Understand the biochemical functions of fat soluble and water soluble vitamins. CO5: To acquire the knowledge about protein denaturation and renaturation.

CO6: Understand the function of proteins.

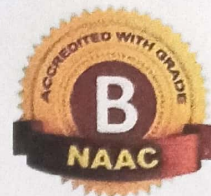
Course Code WBAT-126 Metabolic Pathways Paper-II

At the end of the course the students will be able to- CO1: Understand the protein metabolism.





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CO2: To acquire the knowledge about transamination and oxidative domination. CO3: Understand the metabolic fates of amino acid and learn about urea cycle. CO4: Understand the biochemistry of fermentation process.

CO5: Understand the concept of homeostasis.

CO6: Understand the regulation of enzyme at different level and it's types.

Course Code WBAT-127 Basic of Beer, Wine and Alcohol Technology:

At the end of the course the students will be able to-

CO1: Understand the fundamentals of traditional and commercial winemaking practices. CO2: To acquire knowledge about raw materials and equipment use in wine production. CO3: To gain knowledge about the history of brewing.

CO4: Understand the various type of alcoholic beverages.

CO5: Understand the anatomical and chemical constituents of oak and its role. CO6: To gain knowledge about the role of sulphur dioxide in vilification.

Course Code WBAT-128 Sensory Evaluation of Wine Paper-II:

At the end of the course the students will be able to-

CO1: Acquainting students with wine clarity and wine aroma. CO2: To acquire knowledge about various wine tasting sheet.

CO3: Familiarize the students with tasting exercises and tasting situations. CO4: To acquire knowledge about new trends in the world of wine.

CO5: Understand the rules of matching food with wine

CO6: To gain knowledge and understand the primary, secondary, and tertiary wine aroma.





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Semester-III Course Code WBAT-231 Yeast Technology Paper-I :

At the end of the course the students will be able to-

CO1: Understand the yeast cell morphology, taxonomy and functions. CO2: Understand the importance of yeast strains in wine making.

CO3: To acquire knowledge about various yeast strain preservation techniques. CO4: To gain knowledge about normal micro flora and pathogens of grape wine. CO5: Understand the concept of spoilage and their preventive measures in wine. CO6: Understand the primary and secondary metabolites produced by yeast.

Course Code WBAT-232 Fermentation Technology Paper-I :

At the end of the course the students will be able to-

CO1: Understand the types of fermenter and fermenter configuration.

CO2: To acquire knowledge about the parts of fermenter, their body construction and temperature control.

CO3: Understand the concept of sterilization process.

CO4: To gain knowledge about how to maintenance aseptic conditions during fermentation process

CO5: Understand the fermenter operation modes.

CO6: To acquire knowledge about the utilities required for fermentation.

Course Code WBAT-233 Brewing Technology-I:

At the end of the course the students will be able to-

CO1: Understand the how different beer styles are created.

CO2: Understand the fundamentals of various brewing production steps.

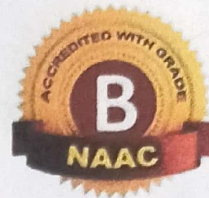
CO3: To acquire knowledge about the structure and function of barley and malt. CO4:

Understand the culture characteristic which used in brewing technology.





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CO5: To gain knowledge about malt production process. CO6: Understand diverse beer style produced in world

Course Code WBAT-234 Alcohol Technology-I:

At the end of the course the students will be able to-

CO1: To acquire knowledge about the raw materials used in alcohol production. CO2: Understand various alcoholic product produced by distillation in distillery CO3: Familiarize molasses handing, sterilization/pasteurization in distillery.

CO4: Understand the conventional batch process for distillery in fermentation. CO5: Understand the basic and application of enzyme in alcohol production CO6: Understand the saccharification process.

Course Code WBAT-235 Biochemistry Paper-I:

At the end of the course the students will be able to-

CO1: Understand the concept of extraction and purification of metabolites from fermented broth.

CO2: Understand the biological degradation of malic acid.

CO3: Understand the methodology for the microbiological stabilization of must and wine.

CO4: Understand the controlling of microbial flora and spoilage.

CO5: To acquire knowledge about fermentation and production of H₂S during wine fermentation.

CO6: Understand the technique which used to determine a wine's propensity to develop turbidity and identification of sediment in wine.

CO7: Understand bacterial degradation of citric acid, tartaric acid and glycerol.

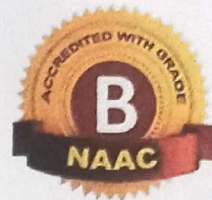
Course Code WBAT-236 Vineyard Technology Paper-I:

At the end of the course the students will be able to- CO1: Understand the basic concept of pedology.





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CO2: Understand the relationship between grape wine and climatic factors.

CO3: To acquire knowledge about the selection of grape varieties for plantation and its various method of plantation.

CO4: To acquire knowledge about canopy management and their techniques. CO5: Understand the concept of macro and micronutrients.

CO6: Understand the principles of weathering of rocks and materials.

Course Code WBAT-237 Environment Awareness:

At the end of the course the students will be able to-

CO1: Students will learn about the detailed environmental statuses. CO2: Students will be able to understand the various varied ecosystem.

CO3: Students will understand regarding various Renewable and Non-Renewable resources.

CO4: Students will learn about conservation of biodiversity.

Course Code WBAT-238 English Communication:

At the end of the course the students will be able to-

CO1: Reading and Understanding ability enhanced. CO2: Discussion and reasoning ability enhanced.

CO3: Self Improvement ability enhanced. CO4: Interviewing Techniques Enhanced.

Semester-IV

Course Code WBAT-241 Yeast Technology Paper-II:

At the end of the course the students will be able to-

CO1: Understand the preparation of yeast starter cultures. CO2: Understand the concept of killer factors in fermentation.

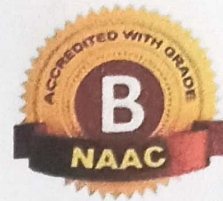
CO3: Understand the importance of yeast in grape flavor development.

CO4: To gain knowledge about role of bacterial enzyme in varietal characteristic of wine.





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CO5: Understand the controlling degree in alcoholic fermentation. CO6: Understand aromatic substances and their transformation by yeast.

Course Code WBAT-242 Fermentation Technology Paper-II:

At the end of the course the students will be able to-

CO1: Understand the principles of media sterilization. CO2: Understand the concept of media formulation.

CO3: To gain knowledge about the types of inoculums.

CO4: To acquire knowledge of microbial production of organic and amino acids. CO5: Understand the autolysis of yeast cell.

CO6: Understand the concept of media optimization.

Course Code WBAT-243 Wine Technology-I:

At the end of the course the students will be able to-

CO1: To acquire knowledge about various grape varieties used in production of different red wine styles.

CO2: Comparative studies on basic production step of white and red wine CO3: Understand pre fermentation production step in red wine making

CO4: Understand the study of different yeast strain used for red wine making. CO4: Understand post fermentation production step in red wine making

CO5: Understand the effect of temperature on grape maturation. CO6: To acquire knowledge about how to control wine quality.

Course Code WBAT-244 Wine Technology-II:

At the end of the course the students will be able to-

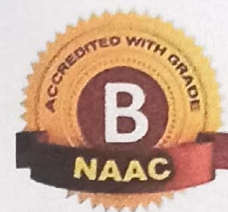
CO1: To acquire knowledge about various grape varieties and yeast strain used in white wine Production.

CO2: Understand pre fermentation production step in white wine making CO3: To gain knowledge about sweet wine, sparkling wine and fortified wine





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production.

CO4: To acquire knowledge about bottling like corking, sealing adjustment of sulfur dioxide.

CO5: Understand post fermentation production step in white wine making CO6: Understand the chemical composition of grape juice.

Course Code WBAT-245 Waste Treatment Paper-I:

At the end of the course the students will be able to-

CO1: To gain knowledge about waste water treatment plant design. CO2: Understand the concept of fermentation industry waste.

CO3: Understand the types of waste, waste water treatment objectives and regulation. CO4: Understand physical, chemical and biological process to treat waste water CO5: Understand the sludge treatment and disposal.

CO6: Understand the concept of waste water composition and studies their characteristic.

Course Code WBAT-246 Vineyard Technology Paper-II:

At the end of the course the students will be able to-

CO1: understand the harvesting techniques and machinery. CO2: To acquire knowledge about propagation technique. CO3: Understand the bench grafting and budding technique.

CO4: Understand the reproductive and vegetative cycle of grapes.

CO5: Understand the evaluation of organic acids, minerals and nitrogen and their origin. CO6: Understand the development stages of grape.

Course Code WBAT-247 Environment Awareness:

At the end of the course the students will be able to-

CO1: Students will learn about the detailed environmental statuses. CO2: Students will be able to understand the various varied ecosystem.

CO3: Students will understand regarding various Renewable and Non Renewable





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resources.

CO4: Students will learn about conservation of biodiversity.

Course Code WBAT-248 English Communication:

At the end of the course the students will be able to-

CO1: Reading and Understanding ability enhanced. CO2: Discussion and reasoning ability enhanced.

CO3: General and reasoning ability enhanced. CO4: Interviewing Techniques Enhanced.

T.Y.B.Sc. (WBAT)

Semester-V

Course Code WBAT-351: Basic Chemical Engineering

At the end of the course students will be able to-

CO1: Understand the role and importance of chemical engineering in various industries, including pharmaceuticals, petrochemicals, food processing, and materials.

CO2: Gain a solid understanding of fundamental chemical concepts such as atomic structure, chemical bonding, stoichiometry, and chemical reactions.

CO3: Learn the principles of material and energy balances, including the conservation of mass and energy, and their applications in chemical processes.

CO4: Understand the behavior of fluids, including fluid statics, fluid flow in pipes, and fluid dynamics, and their relevance to chemical engineering processes.

CO5: Understand the principles of mass transfer, including diffusion and interphase mass transfer, and their significance in separation processes such as distillation, absorption, and extraction.

Course code WBAT-352 : Equipment & utilities

At the end of the course students will be able to-

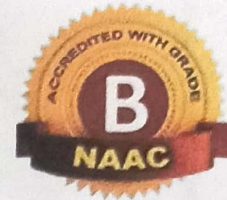
CO1: Understanding and selection of beverage production equipment.

CO2: Ensuring quality control and regulatory compliance.





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CO3: Effective management of utilities for production processes.

CO4: Maintenance and troubleshooting skills for equipment.

CO5: Integration with brewing and distillation processes.

CO6: Awareness of emerging technologies and innovations

Course code WBAT-353: Health benefits of alcoholic beverages -I

At the end of the course students will be able to-

CO1: Understanding and evaluating health effects.

CO2: Critical analysis of scientific literature.

CO3: Identification of bioactive compounds.

CO4: Assessment of moderate consumption guidelines.

CO5: Analysis of population studies.

CO6: Discussion of risks and benefits.

Course Code WBAT-354: Microbial spoilage and other defects

At the end of the course students will be able to-

CO1: Identification of common spoilage microorganisms.

CO2: Understanding of factors influencing microbial growth and spoilage.

CO3: Recognition of signs and symptoms of microbial spoilage and defects.

CO4: Knowledge of preventive measures to control microbial contamination.

CO5: Application of preservation techniques to extend product shelf life.

CO6: Ability to conduct microbial testing and analysis.

Course Code WBAT-355: Marketing of alcoholic beverages

At the end of the course students will be able to-

CO1: Understanding consumer behavior and preferences in the alcoholic beverage market.

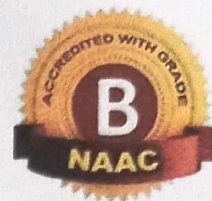
CO2: Knowledge of marketing strategies specific to alcoholic beverages, including branding, packaging, and promotion.

CO3: Ability to analyze market trends, competitive landscape, and consumer demographics.





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CO4: Application of marketing principles to develop effective advertising campaigns and sales initiatives.

CO5: Understanding of regulatory constraints and compliance issues in alcohol advertising.

CO6: Skill development in market research, product positioning, and pricing strategies.

Course Code WBAT-356 : Business management

At the end of the course students will be able to-

CO1: Understanding of fundamental business principles and concepts.

CO2: Knowledge of organizational structures, functions, and processes.

CO3: Ability to analyze business environments and identify opportunities and threats.

CO4: Skill development in strategic planning, goal setting, and decision-making.

CO5: Proficiency in financial management, including budgeting, accounting, and financial analysis.

CO6: Effective leadership and team management skills.

Course Code WBAT-3510 : Bio analytical Techniques

At the end of the course students will be able to-

CO1: Proficiency in various analytical techniques used in biological sciences.

CO2: Understanding of sample preparation methods for biological samples.

CO3: Skill development in chromatographic separation techniques.

CO4: Competence in spectroscopic methods for biomolecule analysis.

CO5: Knowledge of mass spectrometry and its applications in bioanalysis.

CO6: Ability to interpret and analyze bioanalytical data accurately.

Course Code WBAT-3511 : Computer aided applications

At the end of the course students will be able to-

CO1: Mastery of computer software tools for various applications.

CO2: Understanding of design principles and techniques.

CO3: Integration of computer-aided applications in engineering and design projects.





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- CO4: Knowledge of emerging trends and advancements in computer-aided technologies.
- CO5: Application of computer-aided applications in real-world problem-solving scenarios.
- CO 6: Familiarity with computer-aided design (CAD) standards and practices.

Semester-VI

Course Code WBAT-361: Sensory evaluation of wine, beer and alcohol

At the end of the course students will be able to-

- CO1: Mastery of sensory analysis techniques specific to wine, beer, and other alcoholic beverages.
- CO2: Understanding of key sensory attributes such as appearance, aroma, taste, and mouthfeel.
- CO3: Proficiency in descriptive sensory analysis to evaluate beverage characteristics.
- CO4: Skill development in sensory discrimination testing to identify differences between products.
- CO5: Competence in sensory profiling to assess consumer preferences and market trends.
- CO 6: Ability to apply statistical analysis methods to sensory data interpretation.

Course Code WBAT- 362: Waste treatment paper –II

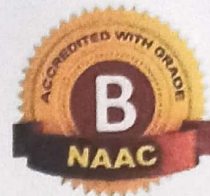
At the end of the course students will be able to-

- CO1: Understanding of waste generation sources and types.
- CO2: Knowledge of waste treatment methods, including physical, chemical, and biological processes.
- CO3: Proficiency in waste characterization and analysis techniques.
- CO4: Skill development in waste minimization and resource recovery strategies.
- CO5: Application of risk assessment and mitigation strategies in waste treatment.





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ISO 9001:2015 Certified

CO 6: Collaboration with stakeholders to develop effective waste management solutions.

Course Code WBAT-363 : Health benefits of alcoholic beverages-II

At the end of the course students will be able to-

CO1: Understanding of research findings regarding health effects of moderate alcohol consumption.

CO2: Recognition of potential benefits on cardiovascular health, cognitive function, and longevity.

CO3: Ability to critically evaluate scientific literature on alcohol's health impacts.

CO4: Awareness of guidelines for responsible alcohol consumption.

CO5: Knowledge of bioactive compounds in alcoholic beverages and their effects.

CO 6: Application of evidence-based recommendations for health promotion.

Course Code WBAT- 364 : Maturation and aging of alcoholic beverages

At the end of the course students will be able to-

CO1: Understanding of maturation and aging processes in alcoholic beverages.

CO2: Recognition of factors influencing flavor development during maturation.

CO3: Proficiency in assessing sensory changes in aged beverages.

CO4: Skill development in selecting appropriate aging techniques and materials.

CO5: Integration of maturation principles into beverage production processes.

CO 6: Application of aging techniques to enhance product differentiation and value.

Course Code WBAT- 365 : Alcohol marketing laws and regulatory policies

At the end of the course students will be able to-

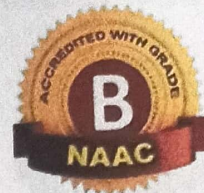
CO1: Understanding of laws and regulations governing alcohol marketing.

CO2: Recognition of key stakeholders involved in alcohol regulation.





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CO3: Proficiency in interpreting and applying advertising standards and restrictions.
CO4: Skill development in navigating licensing requirements for alcohol marketing.
CO5: Competence in compliance with age-restriction policies and responsible marketing practices.

CO 6: Ability to assess the impact of regulatory policies on alcohol marketing strategies.

Course Code WBAT- 366 : Wine technology- III

At the end of the course students will be able to-

CO1: Understanding of wine production processes and technologies.
CO2: Recognition of grape varieties and vineyard management practices.
CO3: Proficiency in grape harvesting and sorting techniques.
CO4: Skill development in grape crushing, pressing, and juice extraction methods.
CO5: Competence in fermentation techniques and yeast selection.
CO 6: Ability to manage temperature control during fermentation and aging.

Course Code WBAT- 3610: Brewing technology -II

At the end of the course students will be able to-

CO1: Understanding of brewing principles and processes.
CO2: Recognition of raw materials used in brewing, including malt, hops, yeast, and water.
CO3: Proficiency in mashing, lautering, boiling, and fermentation techniques.
CO4: Skill development in yeast management and fermentation control.
CO5: Competence in wort cooling, clarification, and conditioning methods.
CO 6: Ability to apply quality control measures throughout the brewing process.





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Course Code WBAT- 3611 : Alcohol technology - II

At the end of the course students will be able to-

CO1: Understanding of alcohol production processes and technologies.

CO2: Recognition of raw materials used in alcohol production, such as grains, fruits, or sugarcane.

CO3: Proficiency in fermentation techniques and yeast selection for alcohol production.

CO4: Skill development in distillation methods for alcohol concentration.

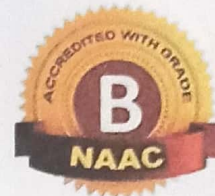
CO5: Competence in purification and filtration processes to refine alcohol quality.

CO 6: Ability to manage temperature control and environmental conditions during production.





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M.Sc. Wine, Brewing and Alcohol Technology Programme outcomes:

This programme intends to blend the theoretical knowledge with practical learning skills with a view to prepare students for careers in industry, notably alcoholic beverages industry such as winery, distillery and brewery etc

PO-1: Knowledge: students are encouraged to apply the knowledge of fundamentals of wine, beer and alcohol production while dealing with complex technical problem and . A student is exposed to a wide range of topics in wine, beer and alcohol production and is given intensive training in laboratory related work. The students are encouraged to develop an ability to be a specialist in wine/beer/alcohol production.

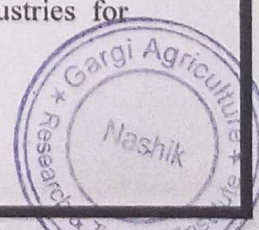
PO-2: Problem Analyses: students will be able to conduct research literature survey, identify, formulate and analyze complex problems in wine, beer and alcohol production and reach concrete solutions using fundamental principles. Students will be able to interpret and analyze results from various experiments and draw suitable conclusions against their supported data acquired.

PO-3: Designing Solutions: students are trained to design solutions for production problems and develop a process that can meet specific needs.

PO-4: Modern tool usage: As an outcome students are trained to create, select, and apply appropriate techniques, resources and tools in the analysis and synthesis of data with an understanding of the limitations.

PO-5: Communication Development: Students will be able to communicate effectively on scientific issues with the scientific community and society at large in writing effective reports and designing documentation, make effective presentations and give and receive appropriate instructions.

PO-6: Employability: Along with academic excellence, we aim at making our students suitable for employment in alcoholic beverages industry. In the effort to train our students for industry, we attempt to seek collaboration and co-operation from various industries for organizing internship and on-campus interview.





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PO-7: Ethics: Along with spirit of competitiveness among students, we give importance in developing a strong sense of ethics among Students by manifesting the impact that science has on social, economic and environmental issues. At the end of this programme students will be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the wine practice.

PO-8: Environment and Sustainability: This programme facilitates understanding of the impact of the professional solutions in societal and environmental contexts through classroom discussions and research projects. At the end of this programme students will be able to identify and analyse problems deterrent to environmental sustainability and provide creative solutions towards the same.

PO-09: Science and Society: students are encouraged to apply logical reasoning based on the knowledge, skills, designing solutions to evaluate societal, health, safety issues and the responsibilities that go along with the scientific practice.

PO-10: Life-long learning: students are encouraged to volunteer and be self-motivated that will enhance society values, active involvement, personality development, self-sustainability, and employability. As such, students will be able to recognize the need for the preparation and have the ability to engage in independent and life-long learning in every broad context of technological changes

SEMESTER- I COURSE CODE: WT 511 MJ Microbiology of Wine, Beer & Alcohol

CO -1. Knowledge of the types of microbes, its cytology, staining techniques and role in alcohol, beer and wine industries.

CO -2. Knowledge of the sterilization and disinfection principles and its use in alcohol, beer and wine industries.

CO -3. Knowledge of the isolation of microbes and its growth in the laboratory using various types of media. Also, growth pattern of microbes and its measurement.

CO -4. Knowledge of the use of microbes in various fermentation industries.





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WT 512 MJ: Biochemistry of wine, Beer & Alcohol

CO-1. Knowledge of the basic concepts of biochemistry.

CO-2. Knowledge of the proteins, amino acids, lipids, their types and metabolism

CO-3. Knowledge of the enzymes & vitamins, their kinetics and its use in in alcohol, beer and wine industries.

CO-4. Knowledge of the biochemistry of alcoholic fermentation, basic pathways involved and biochemistry of secondary fermentation of wine.

WT 513 MJ Vineyard Technology

CO-1. Idea and information of the physical and chemical properties of soil used for cultivation of grapes, grapevine planting materials and its propagation.

CO-2. Knowledge of the site selection for the cultivation of the grapes, irrigation climate & vegetative analysis

CO-3. Information regarding selection of cuttings treatment and storage, propagation by layering propagation of grafted vines etc,

CO-4. Vineyard establishment, Grapevine pests and diseases, Developmental stages of grapes and harvesting of grapes for wine production.

WT 510 RM- Research Methodology

CO-1 Understand research terminology

CO-2 Describe quantitative, qualitative and mixed methods approaches to research

CO-3 Identify the components of a literature review process

CO-4 Analyse and interpret the research.

CO-5 Apply ethical principles of research in preparation of scientific documents.

WT 515 MJ: Viticulture

CO-1. Knowledge of the soil management for grape cultivation, the role of soil in root growth, soil moisture, soil air, soil temperature, organic matter and biological factor; Climate: Light, Temperature, Air, Rainfall, Humidity, carbon dioxide and effect of climate at different growth stages etc.

CO-2. Knowledge of the planting material used for grape cultivation, sanitary selection, disease elimination, genetic selection etc.

CO-3. Knowledge of the development stages of grapes, its harvesting and post-harvest management of grapes used for wine production.

CO-4. Information and idea of the biotechnological tools to access genetic purity and diversity, Applications of genetically control mechanism in grapes development and development of grape varieties resistant to various biotic and abiotic stresses.





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WT 516 MJ : Alcohol Technology-I

CO-1. Overview of molasses composition, grades, storage and cost. & details of molasses weighing system used in distillery.

CO-2. Knowledge of the BH Molasses, sugar syrup & sugarcane juice used for alcohol fermentation & its composition and use for alcohol fermentation. Also they get information about molasses dilution practices adopted and design of diluter, quality of dilution water used in distillery. Also they get information about Pre-Clarification of molasses advantages & drawback.

CO-3. Knowledge of the Classification of alcohols, Important chemical reactions of alcohol, Scenario of ethanol blending programme in India, Current status of ethanol blending programme.

CO-4. Knowledge regarding alcohol based chemicals.

WT 517 MJ Food Technology

CO-1. Classifications and composition of fruits, vegetables and spices.

CO-2. Food additives used in food industries.

CO-3. Theory of food spoilage

CO-4. Effect of spoilage & microbes in fermented food.

WT 518 MJ: Microbial Screening & Strain improvement

CO-1. Knowledge regarding primary & secondary screening of microbes.

CO-2. Information about the detection & assay of fermentation products.

CO-3. Knowledge of strain improvements and its techniques

CO-4. Knowledge of Improved yeast strains used in alcoholic beverages.

WT 519 MJ: Biochemical Engineering

CO-1. Microbial cell growth kinetics

CO-2. Stoichiometry and Stoichiometry of microbial growth and product formation

CO-3. Techniques used for recovery and purification of products:

CO-4. Finishing steps for purification of product

SEMESTER-II WT 521 MJ Enology-I

CO-1. Knowledge of history of wine, classification and nutritional aspects of wine.

CO-2. Knowledge of principal constituents of grape juice & wine

CO-3. Knowledge of production of red and white wine from grapes.

CO-4. knowledge of Oak & Cooperage





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WT 522 MJ: Brewing Technology-I

- CO-1. knowledge of history, classification and various styles of beer.
- CO-2. knowledge of overview of basic raw materials used for brewing process.
- CO-3. knowledge of use of barley and malt for brewing process.
- CO-4. knowledge of use of hops and yeast for brewing process.

WT 523 MJ: Alcohol Technology-II

- CO-1. Knowledge of yeast maintenance in distillery industry
- CO-2. Knowledge of propagation of yeast in distillery
- CO-3. Details of alcohol fermentation
- CO-4. Batch fermentation process of alcohol fermentation and its control

WT 525 MJ: Brewing Microbiology

- CO-1. Knowledge of microflora of barely & malt
- CO-2. Knowledge of Gram positive and Gram negative bacteria involved in brewing process.
- CO-3. Knowledge of wild yeast involved in brewing process.
- CO-4. Knowledge of rapid detection of microbial spoilage

WT 526 MJ : Green Technology

- CO-1. knowledge of green chemistry and technology
- CO-2. knowledge of role of industry, Industrial ecology, role of industrial ecology in green technology
- CO-3. knowledge of Concept of biorefinery, Concept of circular economy, and formation of biochemicals
- CO-4. knowledge of Waste to wealth Production of Bio CNG, Bio compost, Hydrogen, etc.

WT 527 MJ: Equipment in alcoholic beverages

- CO-1. knowledge of Required utilities services & industrial equipment's used in alcohol industries
- CO-2. Information of functions and uses of each equipment's
- CO-3. Winery & brewery Sanitization
- CO-4. Special Lab equipment's used in alcohol industries

WT-528 MJ : Fermentation Technology

- CO-1. Scope and importance of fermentation and types of fermenters
- CO-2. Sterilization process used in fermentation
- CO-3. Development of Inoculum for industrial fermentation
- CO-4. Details of production media formulation





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WT 529 MJ : Plant Engineering

CO-1. Mass, Material and steam balance, Process design development and General design considerations

CO-2. Computer-aided design, Optimum design and design strategy

CO-3. project economics

CO-4. Cost and asset accounting, Cost estimation, Interest and investment costs, Taxes and insurance.

WT 530 MJ: Sensory Evaluation & Serving of wine

CO-1. Sensory Evaluation & Serving of wine

CO-2. Threshold of sweetness, acid taste & bitterness

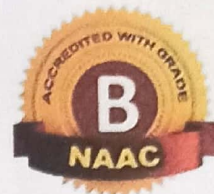
CO-3. Scoring wine and wine evaluation under different conditions

CO-4. Wine aroma –Primary, Secondary & Tertiary and wine serving principles.





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SEMESTER-III

COURSE CODE: WT 3.1 Alcohol Technology –II

After successfully completing this course, students will be able to:

CO1: Understand the characteristics of various alcohols, denaturation and by products of alcohol.

CO2: To acquire knowledge about the extra neutral alcohol, anhydrous alcohol and fuel ethanol manufacture.

CO3: Have developed a fairly good knowledge and understanding of various traditional Alcoholic beverages making.

CO4: Familiarize students with analytical aspect of alcoholic beverages

COURSE CODE: WT 3.2 Brewing Technology-II

After successfully completing this course, students will be able to:

CO1: Acquainting students with brew house technology and yeast metabolism.

CO2: Conceptualized control of brewing process.

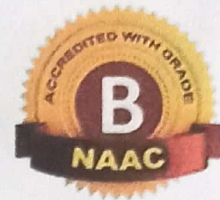
CO3: To gain knowledge about packaging and sanitation aspects in brewery.

CO4: Have acquired a knowledge of brewery by-products and malt analysis.





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COURSE CODE: WT 3.3 Enology-II

After successfully completing this course, students will be able to:

CO1: Developed an understanding of application and importance of various microbes in enology.

CO2: To acquire knowledge about sensory analysis and tasting of wine.

CO3: Understand the concept of wine parks.

CO4: To acquire knowledge about fortified wines, like sherry, port, sweet wine production.

COURSE CODE: WT 3.4 Practical- I

After successfully completing this course, students will be able to:

CO1: Have developed the practical skills for conducting experiments base on whisky sampling.

CO2: Understand the isolation techniques of lactic acid and acetic acid bacteria and yeast.

CO3: Developed skills to produced wine other than grapes as well as brandy from wine. **CO4:**

Have developed the practical skills for conducting experiments base on beer sampling. **CO5:**

Are able to perform experiments base on analysis of wine

COURSE CODE: WT 3.5 Marketing of alcoholic beverages

After successfully completing this course, students will be able to: **CO1:**Familiarize students with the principles of wine marketing. **CO2:** To gain knowledge about marketing opportunities.

CO3: Understand the financial management and sales, distribution channel.

CO4: Have developed a fairly good knowledge and understanding of marketing aspects of wine and brand development.

COURSE CODE: WT 3.6 Practical- II

After successfully completing this course, students will be able to: **CO1:** Acquired skill to develop a strategy for marketing brand. **CO2:** Are capable of developing brand and label of wine.





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CO3: Understand the market forecasting & market segmentation.

CO4: Understand the bottle labeling & packaging.

SEMESTER-IV

COURSE CODE: WT 4.1 Industrial waste treatment & Environmental management

After successfully completing this course, students will be able to:

CO1: Understand the concept of waste generation and characteristics of effluent.

CO2: Provide knowledge about winery & brewery sanitization and waste disposal regulation.

CO3: Students will gain concept of waste water disposal systems in industries and air pollution.

CO4: To provide knowledge about water conservation in distilleries.

COURSE CODE: WT 4.2 Business Management

After successfully completing this course, students will be able to:

CO1: Understand the concept of business management and communication in industry.

CO2: Have developed a fairly good knowledge of production management and process.

CO3: Acquainting students with financial managements

CO4: To gain knowledge about marketing management & buying behavior as well as patents.

COURSE CODE: WT 4.3 Chemical and Plant Engineering-II

After successfully completing this course, students will be able to:

CO1: Understand the concept of mass balance and separation techniques.

CO2: To gain knowledge about heat transfer process.

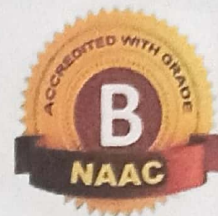
CO3: To acquire knowledge about pumps and their applications.

CO4: Have developed an understanding of fluid mechanics, design of distillation column and industrial automation .





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COURSE CODE: WT 4.4 Research Project

After successfully completing this course, students will be able to: CO1: Understand some basic concepts of research and its methodologies

CO2: Analyze a particular industry based problem or topic in depth.

CO3: Analyses their results & present the same in the form of dissertation.

CO4: Investigation in advanced topics of research.

CO5: Improve fundamentals research and analysis skills.

CO6: After completing industrial training / enterprises, the students would submit training report and bring out innovations, novel ideas or the further improvements related to products being produced by such organizations

COURSE CODE: WT 4.5 Alcohol Technology-III

After successfully completing this course, students will be able to:

CO1: Have developed a very good understanding of continuous fermentation .

CO2: Understand the fed batch fermentation systems as well as production of alcohol from non-molasses sources .

CO3: Understand the importance of spectroscopic and chromatographic techniques in alcohol industries.

CO4: Understand the concept of multi pressure distillation and molecules.

COURSE CODE: WT 4.6 Brewing Technology-III

After successfully completing this course, students will be able to:

CO1: Have developed a fairly good knowledge and understanding of the beer types and their special features.

CO2: Familiarize students with process of aging & finishing.

CO3: To gain knowledge about bottling/ canning the beer.

CO4: Acquainting the students with micro/pub brewing.





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COURSE CODE: WT 4.7 Enology-III

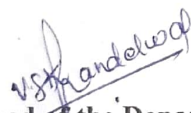
After successfully completing this course, students will be able to:

CO1: Developed knowledge of post fermentation treatments of wines.

CO2: Understand the maturation and aging of wine.

CO3: To gain knowledge about wine defects.

CO4: Full knowledge of working in blending and bottling of wine.


Head of the Department


Principal
Principal
**Gargi Agriculture Research
& Training Institute**

