Web Application Programming
Infinity and a Point

CS472

January 2022

Professor
Bruce Lester, Ph.D.

CS472
Web Application Programming: Infinity and a Point
January 2022

Course Overview

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
Week 1	HTML and CSS	CSS for Styling	CSS for Page Layout	HTML Forms	Javascript Language	Javascript Programming Environment
Week 2	Scope and Closures in Javascript	Modules and Objects in Javascript	Module Pattern in Javascript	Lab Day and Review	Midterm Examination	jQuery and the DOM
Week 3	jQuery Event Handling	jQuery Tree Traversal	Ajax and JSON	Introduction to Node.js	Node.js Express Framework	Node.js Templates and Database Access
Week 4	Online Dictionary Project	Cookies and Sessions	Online Dictionary Project	Final Examination		

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COURSE GOAL

This course provides a systematic introduction to programming interactive and dynamic web applications for individuals with little or no prior web application programming experience.

Course Objectives

1. Gain a working knowledge of the fundamentals of HTML to specify webpage content.

2. Learn the basics of CSS to specify website styling and layout.

3. Gain a deep understanding of the Javascript language for making webpages more responsive.

4. Develop skill in using the *jQuery* Library to access the Document Object Model.

5. Have knowledge and experience with Node.js for creating dynamism in websites.

SYLLABUS

WEEK ONE

Monday   HTML
                          Create your Homepage (Lab 0)

Tuesday   CSS for Styling
                          https://www.w3schools.com/css/default.asp
                          About Me webpage (Lab 1)
                          Recipe webpage (Homework 1)

Wednesday   CSS for Page Layout
                          Movie Review webpage (Homework 2)

Thursday   HTML Forms
                          https://www.w3schools.com/html/html_forms.asp
                          Grades Exercise
                          Nerdluv Sign-up Page (HTML Forms Lab)

Friday   Javascript for Modern Web Applications
                          OnClick Alert
                          Tip Calculator Exercise (make it work correctly)

Saturday   Javascript Programming Environment
                          Answer: Javascript Timer Exercises
                          Decorate My Text Lab

WEEK TWO

Monday   Scope and Closures in Javascript
                          Javascript and ASCII Animation webpage (Homework 8)

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Tuesday	Modules and Objects in Javascript
	Read: Closures
	Read: Javascript Closures and the Module Pattern
	Answer: Scope Exercises
	Modules and Closure Lab

Wednesday	Module Pattern in Javascript
	Read: Javascript Scope
	Read: Mastering the Module Pattern
	Read: Javascript Function Closures
	Answer: Module Exercises

Thursday	Lab Day and Review

Friday	Midterm Examination

Saturday	jQuery and the DOM
	Read: Head First jQuery (Chapters 1 and 2)
	Answer: jQuery Quiz I
	Mouse Maze Lab

WEEK THREE

Monday	jQuery Event Handling
	Read: Head First jQuery (Chapter 3)
	Read: W3Schools jQuery Tutorial
	Answer: jQuery Quiz II
	DOM and Events: 15 Puzzle (Homework 9)(due Wednesday)

Tuesday	jQuery Tree Traversaal
	Read: Head First jQuery (Chapter 4)
	Answer: jQuery Quiz III
	DOM and Events: 15 Puzzle (continued)

Wednesday	Ajax and JSON

Thursday	Introduction to Node.js
	Exercises N1, N2, N3
	Exercise N4 (Template Literal Version of Simple Adder)
	(Exercises are in the slides)

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Friday   Node.js Express Framework
              Read Express/Node introduction
              Simple Calculator Lab

Saturday   Templates and Database Access
              Number Quiz Lab

WEEK FOUR

Monday   Online Dictionary

Tuesday   Cookies and Sessions
              Online Dictionary

Wednesday   Online Dictionary

Thursday   Final Examination

Evaluation Criteria

Midterm Examination   40%

Final Examination   40%

Labs and Homeworks   15%

Attendance   5%

Course Website

http://www.mumstudents.org/cs472/2022-01-BL/

OnlineTutorial

The following website has tutorials for HTML, CSS, Javascript, jQuery, and Node.js:

W3Schools.com

Class Attendance

Attendance at all classes is required, because all elements of class — lectures, questions and answers, discussions, laboratory work — contribute to the learning process. Absences are usually excused only if you are sick in bed or have a family emergency.

If you must miss a class, please let your instructor know ahead of time. Call, send an email, or send a note with a friend. There is no such thing as a "personal day." If you have personal business to take care of, please schedule it for after class or during the days between blocks. At the same time, it may occasionally be necessary for you to miss a class (or part of a class) for some reason other than illness or family emergency. Please speak with the instructor beforehand, who will be open to considering your needs.

The first lesson of each course is the most important. Students are expected to be present from the first lesson onward. Any student not present on the first day (except for such compelling reasons as illness or family emergency) may be asked to withdraw from the course. Unexcused absences may result in the student receiving a grade of NC (No Credit) for the whole course.

Web Application Programming: Infinity and a Point

COURSE OBJECTIVES, ACTIVITIES, AND ASSESSMENTS

This is what you'll learn to do	This is how you'll learn it	This is what will show you've learned it
1. Use a working knowledge of the fundamentals of HTML to specify webpage content.	By reviewing the slides and reading assignment on HTML in the Web Programming text.	Successful completion of the About Me webpage, Recipe webpage, and Movie Review Webpage
2. Specify website styling and layout using the basics of CSS.	By styling webpages using CSS primitives you have learned in class.	Completion of the Recipe webpage and Movie Review Webpage; also results from the Midterm Exam.
3. Make webpages more responsive using a deep understanding of the Javascript language.	By reviewing the slides and assigned readings and quizzes on the use of the Javascript language.	Mouse Maze website and 15 Puzzle website; also results from the Final Exam.
4. Be able to access the Document Object Model skillfully by using the *jQuery* Library.	By reading the *Head First jQuery* text, and answering the jQuery quizzes.	Completion of the Online Dictionary Project and results from the Final Exam.
5. Apply knowledge and experience with Node.js to create dynamism in websites.	By answering the Node.js daily review exercises, and implementing the associated Demos.	Implementation of the Number Quiz project using Node.js; also results from the Final Exam.

Introduction to Web Programming

In this lecture we introduce the basic technologies that make up the Internet, the World Wide Web and the Hyper Text Markup Language (HTML). We will see that many technologies are built on top of other technologies. *The universe is organized in layers. The most basic layer is the unified field of pure intelligence.*

MAIN POINTS

1. The internet is a global computer network that uses the IP protocol to uniquely identify computers on the network. Through the TCP protocol each IP address can work with multiple services at the same time. One of these services is the HTTP protocol which is used by the World Wide Web to transport HTML pages. These are the different layers of the internet. *During the TM technique, the mind experiences the most fundamental layer of the universe, the field of pure intelligence.*

2. The Hyper Text Markup Language uses tags to demarcate different sections of text. An HTML page always starts with a <html> tag, inside of which it has a <head> tag to describe the page, and a <body> tag of the contents that will be displayed. These are the tags you will use for every HTML page. *The most powerful language is the language of nature, which is the impulses of pure intelligence vibrating within itself.*

3. We discussed some of the most common tags used on pages, including headings, paragraphs, images, and links. Use tags based on their semantics (meaning), not based on their visual effect (which can easily be changed). *Through the TM technique, the individual gains access to the language of nature to effortlessly fulfill any desire.*

CONNECTING THE PARTS OF KNOWLEDGE
WITH THE WHOLENESS OF KNOWLEDGE

1. HTML is the basis of Web Programming, every web page is made of HTML.
2. Through a complete understanding of HTML, one can create a any desired pattern on a web page.

3. **Transcendental consciousness** is the experience of the deepest underlying reality, the unified field.
4. **Impulses within the Transcendental field**: the infinite dynamism of the unified field expresses itself into the universe.
5. **Wholeness moving within itself:** In Unity Consciousness, one experiences that this infinite dynamism is the Self.

CSS for Styling

In this lecture we introduce the basics of CSS as a way to give different visual styles to HTML elements, changing their preset default appearance. *The impulses of pure intelligence, the Veda, give rise to all aspects of the universe.*

MAIN POINTS

1. Cascading Style Sheets (CSS) provide a way for web developers to specify the appearance of content on the page by using selectors to specify the element(s), and then the values that properties of those elements (like font or color) should have.

2. We discussed the CSS Properties for color, font, text, background, and lists, which are the basic properties used on almost every page.

3. We can be more specific by using Class selectors (groups of elements) and even more so with id selectors (individual elements).

CONNECTING THE PARTS OF KNOWLEDGE
WITH THE WHOLENESS OF KNOWLEDGE

1. How a page is displayed is affected by both the HTML and the CSS.
2. Although every HTML tag has a default way of displaying, it can easily be changed with CSS and should never be the basis for using it. Instead use HTML tags based on meaning.

3. **Transcendental consciousness** is the field that underlies all differences.
4. **Impulses within the Transcendental field**: the diversity of the universe arises as an expression of the unified field.
5. **Wholeness moving within itself:** In Unity Consciousness, one experiences that this unbounded diversity is the Self.

Page Layout

In this lecture we will discuss the different tools CSS provides for creating a layout. There are a variety of ways to position an element; most of them are based on taking a block level element and placing it in relation to some other block. *Through familiarity with the language of nature, the individual gains complete support of nature.*

MAIN POINTS

1. The <div> tag provides a generic block level element that can be used for any division or section of your page. The <span> tag provides a generic inline element for specifying any range of text inside a block.

2. The Box Model is a description of how every element has a basic width and height, outside of which it has padding, a border, and margin. For inline elements only the left and right margin and padding affect surrounding elements.

3. The CSS float property makes its element move to right or left side of the containing box. The clear property moves its element downwards if there is a floating element on the specified side.

4. Static positioning flows box elements from top to bottom, and inline elements from left to right. Relative positioning keeps the space in the original flow, but displays the element at an offset. Absolute positioning takes the element out of the flow and places it relative to the 'containing element'. Fixed positioning takes the element out of the flow and places it relative to the browser window.

CONNECTING THE PARTS OF KNOWLEDGE
WITH THE WHOLENESS OF KNOWLEDGE

1. You can use floats and positioning to change where elements are displayed.
2. The entire visual appearance of a page can be completely altered using different style sheets.
_____
3. **Transcendental consciousness is** the field of unity.
4. **Impulses within the Transcendental field**: The self-interacting dynamics of the unified field create diversity from unity.
5. **Wholeness moving within itself:** In Unity Consciousness, one experiences this self interacting dynamics as an aspect of one's personal self.

HTML Forms

In this lecture we will discuss how to generate and process user input. On the client side, we will create HTML forms with different types of widgets that allow the users to submit different types of data, and on the server side we will look at processing these different types of data. *The first expression of the Unified Field is Rishi (knower), Devata (process of knowing), Chhandas (known).*

MAIN POINTS

1. An HTML form allows the user to send data (parameters) to the server. Forms are created with the <form> tag, and can be submitted with either an HTTP GET or POST method.

2. HTML provides many different types of input widgets, including text fields, text areas, check boxes, radio buttons, and dropdown lists, this is also an area html 5 is expanding.

3. Although data can be submitted with a GET request, the fact that it's on the URL makes it clumsy and less secure (not what GET is meant for). Instead data should be submitted with a POST request, which is specifically meant for taking data, and keeps things clean.

CONNECTING THE PARTS OF KNOWLEDGE
WITH THE WHOLENESS OF KNOWLEDGE

1. Forms let us submit data to the web server, which can then generate a custom reponse.
2. It is important to distinguish between GET requests with parameters to specify what exactly is desired, and POST requests that submit data and are not requesting a direct response.

3. **Transcendental consciousness** is the experience of pure silence, beyond the duality of action and reaction, input and output.
4. **Impulses within the Transcendental field**: duality is created as the boundless interacts with itself, creating the impression of this and that.
5. **Wholeness moving within itself:** In Unity Consciousness, one becomes aware that the Self is nothing but the boundless unity.

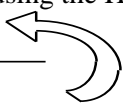# JavaScript for Modern Web Apps:
Spontaneous Right Action

JavaScript is a powerful lightweight loosely typed interpreted functional OO language that makes web pages highly dynamic and responsive. It runs in all browsers and is an increasingly important programming language. **Science of Consciousness:** If our awareness is grounded in pure consciousness then our actions will be dynamic and responsive.

MAIN POINTS

1.   JavaScript is a loosely typed language. It has types, but does no compile time type checking. Programmers must be cautious of automatic type conversions, including conversions to Boolean types. It has a flexible and powerful array type as well as distinct types of null and undefined. **Science of Consciousness:** If our awareness is established in the source of all the laws of nature then our actions will spontaneously be in accord with the laws of nature for a particular environment.

2.   JavaScript programs have no main. They respond to user actions called events. **Science of Consciousness:** We respond most effectively to events in our environment if our awareness is settled and alert.

3.   The purpose of most JavaScript code is to manipulate the HTML DOM, which is a set of JavaScript objects that represent each element on an HTML page. **Science of Consciousness:**   The purpose of most thoughts is to produce successful actions and achievements in the world, and more powerful thoughts will produce more successful actions.

CONNECTING THE PARTS OF KNOWLEDGE WITH
THE WHOLENESS OF KNOWLEDGE
JavaScript for Modern Web Apps: Spontaneous Right Action

1. JavaScript code comes with an HTML page and is executed on the browser.

2. JavaScript reacts to browser events and manipulates the web page using the HTML DOM API.

3. **Transcendental consciousness** is the source of thought and the home of all the laws of nature.

4. **Impulses within the transcendental field:** Thoughts arising from this level will spontaneously be in accord with all the laws of nature.

5. **Wholeness moving within itself:**   In unity consciousness, one appreciates that all events and responses are the play and display of non-changing pure consciousness.
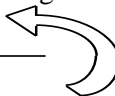
The JavaScript Programming Environment
Actions in Accord with the Laws of Nature

With web applications, JavaScript runs in the environment of a browser. Understanding this special programming environment is critical to success. **Science of Consciousness:** If our thoughts are connected to the home of all the laws of nature, then one will naturally behave according to the principles appropriate for any special environment.

MAIN POINTS

1. JavaScript has a set of global DOM objects accessible to every web page. Every JavaScript object runs inside the global window object. The window object has many global functions such as alert and timer methods. **Science of Consciousness:** To be successful we must have both fine discrimination and broad awareness. The experience of pure consciousness provides global awareness, but also enhances our ability to have fine focus and make careful discriminations.

2. "Unobtrusive" JavaScript promotes separation of web page content into 3 different concerns: content (HTML), presentation (CSS), and behavior(JS). **Science of Consciousness:** This is another example of knower (model), known (view), and process of knowing (controller) which is found throughout computer science and nature. When we experience transcendental consciousness our Self is the knower, and it is also the known, and the experience is itself the process of the knower knowing herself.

3. JavaScript code runs when the page loads it. Event handlers cannot be assigned until the target elements are loaded. Event handlers often use anonymous functions because the code is specific to that event and element. **Science of Consciousness:** Creative intelligence proceeds in an orderly sequential manner. When our thoughts and actions arise from the source of all the laws of nature then we spontaneously act in accord with the natural order of events in nature.

4. The DOM is an API so the JavaScript programmer can conveniently access and manipulate the HTML elements in code. **Science of Consciousness:** The TM and TM-Sidhi programs are techniques that allow anyone to conveniently contact and act at the level of the Unified Field.

CONNECTING THE PARTS OF KNOWLEDGE WITH
THE WHOLENESS OF KNOWLEDGE

1. JavaScript code comes with an HTML page and is executed on the browser.

2. JavaScript reacts to browser events and manipulates the web page using the HTML DOM API.

3. **Transcendental consciousness** is the source of thought and the home of all the laws of nature.

4. **Impulses within the transcendental field:** Thoughts arising from this level will spontaneously be in accord with all the laws of nature.

5. **Wholeness moving within itself:** In unity consciousness, one appreciates that all events and responses are the play and display of non-changing pure consciousness.

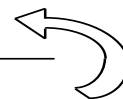# Scope, Closures, and Encapsulation
Life Is Structured in Layers

All natural systems make use of layering of encapsulated subsystems to build up more complex super systems. JavaScript relies heavily on functions for most of its layering and encapsulation.

MAIN POINTS

1. Javascript has global scope and local scope within functions when variables are declared with var. The unified field is the ultimate global scope, where an impulse anywhere is an impulse everywhere.

2. Closures are created whenever an inner function is defined and it closes over its free variables. Closures provide encapsulation of methods and data. Encapsulation promotes self-sufficiency, stability, and re-usability.

3. Objects are another widely used encapsulation mechanism in JavaScript. They are easily created with object literals. They can dynamically add new properties; behave like associative arrays; must use 'this' to refer to properties; and have a prototype property that provides class-like functionality.

CONNECTING THE PARTS OF KNOWLEDGE WITH
THE WHOLENESS OF KNOWLEDGE
Life Is Found in Layers

1. JavaScript is a functional OO language that has a shared global namespace for each page and local scope within functions.

2. Closures and objects are fundamental to JavaScript best coding practices, particularly for promoting encapsulation, layering, and abstractions in code.

3.   Transcendental consciousness is the experience of the most fundamental layer of all existence, pure consciousness, the experience of one's own Self.

4. **Impulses within the transcendental field:** The many layers of abstraction required for sophisticated JavaScript implementations will be most successful if they arise from a solid basis of thought that is supported by all the laws of nature.

5. **Wholeness moving within itself:**   In unity consciousness, one appreciates that all complex systems are ultimately compositions of pure consciousness, one's own Self.

jQuery and the DOM
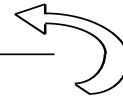# The TM Technique and Pure Consciousness

jQuery is a powerful and convenient API for working with the DOM and handling events that ensures cross-browser compatibility and many additional functions. **Science of Consciousness:** The TM Technique is a powerful and convenient procedure that allows people of any culture to effortlessly transcend thought and experience pure consciousness.

MAIN POINTS

1. The $ ( ) function is heavily overloaded. It will be a different function depending on the arguments it has, including running a callback function on page load, selecting DOM elements, wrapping DOM elements, and creating new DOM elements. **Science of Consciousness:** In ordinary waking state consciousness, we might perceive ourselves as very different people depending on surface characteristics such as our job or skills. By having the experience of pure awareness, we realize that these are all different aspects of our true non-changing Self.

2. When the argument to $( ) is a CSS selector, the function will return a "jQuery object" that contains a group of selected DOM elements. **Science of Consciousness:** Every object is an excitation of the field of pure consciousness.

3. The jQuery object returned by the selection mode of $( ) is a collection of DOM elements wrapped by jQuery functionality. This object can read style properties as well as set them by using the *css* method of jQuery. **Science of Consciousness:** Our TM practice develops our ability to experience quiet states of awareness. Advanced techniques and the TM-Sidhi Program develop abilities to experience and manipulate different characteristics of pure consciousness.

CONNECTING THE PARTS OF KNOWLEDGE WITH
THE WHOLENESS OF KNOWLEDGE

1. jQuery is a powerful and widely used JavaScript library for working with the DOM that provides cross-browser compatibility.

2. When used in selection mode the jQuery function will return a jQuery object, which contains a collection of DOM elements for manipulation.

3. **Transcendental consciousness**. The TM Technique is a convenient and cross-platform API for experiencing transcendental consciousness.

4. **Impulses within the transcendental field:** Thoughts and actions at quiet levels of awareness are simple, natural, and effective because they are in accord with all the laws of nature that reside at these deep levels.

5. **Wholeness moving within itself:**   Advanced TM Techniques and the TM-Sidhi Programs are powerful APIs for bringing the calm dynamism and bliss of pure consciousness into daily activity.
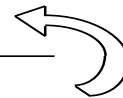
Event Handling: Spontaneous Right Action

JavaScript in the browser is event driven programming. To respond to events we write a JavaScript function and attach it to a DOM element so that it will run when the target DOM event is triggered. **Science of Consciousness:** Our actions will be appropriate and successful if they are in response to the current environment and events, and are not improperly influenced by stresses from old circumstances.

MAIN POINTS

1. jQuery has a simple syntax for attaching events to individual or collections of DOM elements. **Science of Consciousness:** Our actions will be naturally efficient when they are spontaneously in accord with natural law.

2. All JavaScript code runs inside of some object and the 'this' keyword always refers to the current object on which the event occurred. **Science of Consciousness:** The TM technique allows the individual to directly experience the source of all events, the unified field of all the laws of nature.

3. The jQuery "each" method applies a function iteratively to each DOM element from a selected group of elements. **Science of Consciousness:** If our thoughts are connected to the home of all the laws of nature, then our actions will spontaneously be in accord with the entire environment.

CONNECTING THE PARTS OF KNOWLEDGE WITH
THE WHOLENESS OF KNOWLEDGE

1. Event handling is a fundamental aspect of JavaScript programming. jQuery makes it easy to attach event handlers to DOM elements.

2. Some subtle aspects of JavaScript event handlers include the use of event arguments passed to event handlers and the use of the keyword 'this' to refer to different objects.

3. **Transcendental consciousness**. The home of all the laws of nature

4. **Impulses within the transcendental field:** Thoughts arising from this level will be able to spontaneously respond with right actions to events because they are supported by all the laws of nature.

5. **Wholeness moving within itself:** In unity consciousness events and actions are appreciated in terms of their ultimate source in pure bliss consciousness.

jQuery Tree Traversal
Established in the Unified Field, Perform Action

jQuery has a wide range of methods to explore and modify the DOM. For this purpose, the DOM is viewed as tree structure.   **Science of Consciousness:** By experiencing pure consciousness, the whole tree of life is enriched.

MAIN POINTS

1. jQuery *remove* (and *detach*) methods cut HTML elements out of the web page.   **Science of Consciousness:** Our actions will be naturally succesful when they are spontaneously in accord with natural law.

2. jQuery *parent*, *children*, *prev*, and *next* methods can be used to move around the DOM tree. **Science of Consciousness:** All objects and relationships emerge as excitations of the unbounded field of pure consciousness.

3. The jQuery *filter* methods can be applied to a group of selected DOM elements: *first*, *eq*, *last*, *slice*, *filter*, *not*. **Science of Consciousness:**   If our thoughts are connected to the home of all the laws of nature, then our actions will spontaneously be in accord with the entire environment.

CONNECTING THE PARTS OF KNOWLEDGE WITH
THE WHOLENESS OF KNOWLEDGE

1. The HTML of the web page is packaged into a Javascript object called the Document Object Model (DOM).

2. jQuery has a variety of mehods to explore and modify the DOM, thus modifying the web page displayed by the Browser.

3. **Transcendental consciousness**. The home of all the laws of nature

4. **Impulses within the transcendental field:** Thoughts arising from this level will be able to spontaneously respond with right actions to events because they are supported by all the laws of nature.

5. **Wholeness moving within itself:**   In unity consciousness events and actions are appreciated in terms of their ultimate source in pure bliss consciousness.

Ajax: Frictionless Flow of Information

Ajax is a set of programming techniques collectively used to make web applications highly responsive even with rich content. The key aspects of Ajax are downloading data from a server asynchronously in the background, and refreshing part of a page with the returned data. *At the level of the unified field, there is frictionless flow of information.*

MAIN POINTS

1. The key component that a browser provides to enable Ajax is the XMLHttpRequest object, which is supported by all modern browsers. This object opens a connection with a server, sends a message, waits for the response, and then activates a given callback method. **Science of Consciousness:** *The first expression of pure knowledge is knower, known, and process of knowing.*

2. Ajax operations always require a url for the target on the server, a designation of whether to send a Get or Post request, one or more callback functions to be called with the result, and optionally a set of request parameters. jQuery provides convenient wrapper methods: $.ajax(), $.get(), and $.post. **Science of Consciousness:** *The unified field is the "wrapper" for everything in the universe, silently guiding its evolution.*

3. JSON has become more widely used for Ajax data representations than XML because JSON is easier to write and read and is almost identical to JavaScript object literal syntax. **Science of Consciousness:** *Do less and accomplish more.*

CONNECTING THE PARTS OF KNOWLEDGE WITH

THE WHOLENESS OF KNOWLEDGE

1. Client side programming with Javascript is useful for making web applications highly responsive.

2. Ajax allows JavaScript to access the server in a very efficient manner when data must be obtained from the server.

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3. **Transcendental consciousness** is the experience of the deepest underlying reality, the unified field.

4. **Impulses within the Transcendental field**: the infinite dynamism of the unified field constantly expresses itself and becomes all aspects of the universe.

5. **Wholeness moving within itself:** In Unity Consciousness, one experiences that this infinite dynamism is nothing but the Self.

Introduction to Node.js

MAIN POINTS

1. Node.js is a way to create JavaScript applications outside the browser. This allows us to create JavaScript based web applications. These are event-driven with non-blocking I/O, which can give excellent scalability and performance. *Science of Consciousness*: Every action has an equal and opposite reaction. By using event driven code instead of blocking code, we can give a much better 'reaction' to an incoming event / action.

2. Node implements the CommonJS module specification. This allows the programmer to include additional libraries (.js code files) into their code using the **require()** function, which returns the **module.exports** object defined in the specified .js file. *Science of Consciousness:* Knowledge can be gained from inside and outside.

Express Framework

MAIN POINTS

1. Express is a web application framework; it provides us with a lot of functionality to more easily make web applications. It also has a variety of useful (but optional) configuration options. *Science of Consciousness*: Do less and Accomplish more.

2. Middleware are optional components (functions) for Express that can help process the request / response. Optionally you can specify for which route URL(s) the middleware should be used. *Science of Consciousness*: Do less and Accomplish more.

3. Using app.get() and app.post() we can specify how a HTTP GET or POST to a certain URL should be handled. The Router class allows us to group related routes together in separate files. *Science of Consciousness*: Life is found in layers.

4. HTTP POST requests should never return HTML, instead they should return an HTTP redirect. Express allows us to easily send redirects using the res.redirect() function. *Science of Consciousness*: Purification leads to progress. It's best to only use the HTTP methods for their intended purpose, violating their purpose makes things muddy.

Templates and Database Access

MAIN POINTS

1. Templates allow you to separate your view logic into separate files. These files are basically HTML, but have additional special syntax to include variables and control statements. *Science of Consciousness*: Purification leads to Progress.

2. The response object has a render() method that can be used to specify a template file. The local variables for the template can either be passed in as a second parameter to render() or get set beforehand on response.locals. *Science of Consciousness*: Every action has an equal and opposite reaction.

Cookies and Sessions

MAIN POINTS

1. A cookie is a key value pair that the server gives to a client with a time out. Each request after that (if the timeout hasn't expired) the client will give that key value pair back to the server. *Science of Consciousness*: Every action has an equal and opposite reaction. The server gives a cookie, and the client gives it back.

2. When creating a response on the server we can set cookies. When processing a request on the server, we can look for cookies that the client sent back. The server can make it aa permanent' cookie by giving a timeout, and optionally sign them with a hashcode to prevent tampering. *Science of Consciousness*: As we grow in consciousness we start to see and understand finer mechanics of natural law, understanding what was in the past and what will probably be in the future.

3. Sessions use a cookie to give each client a unique identifier (session id), this identifier is then used on the server to find key/value storage pairs that we can access on req.session. *Science of Consciousness*: Knowledge is gained from inside and outside.