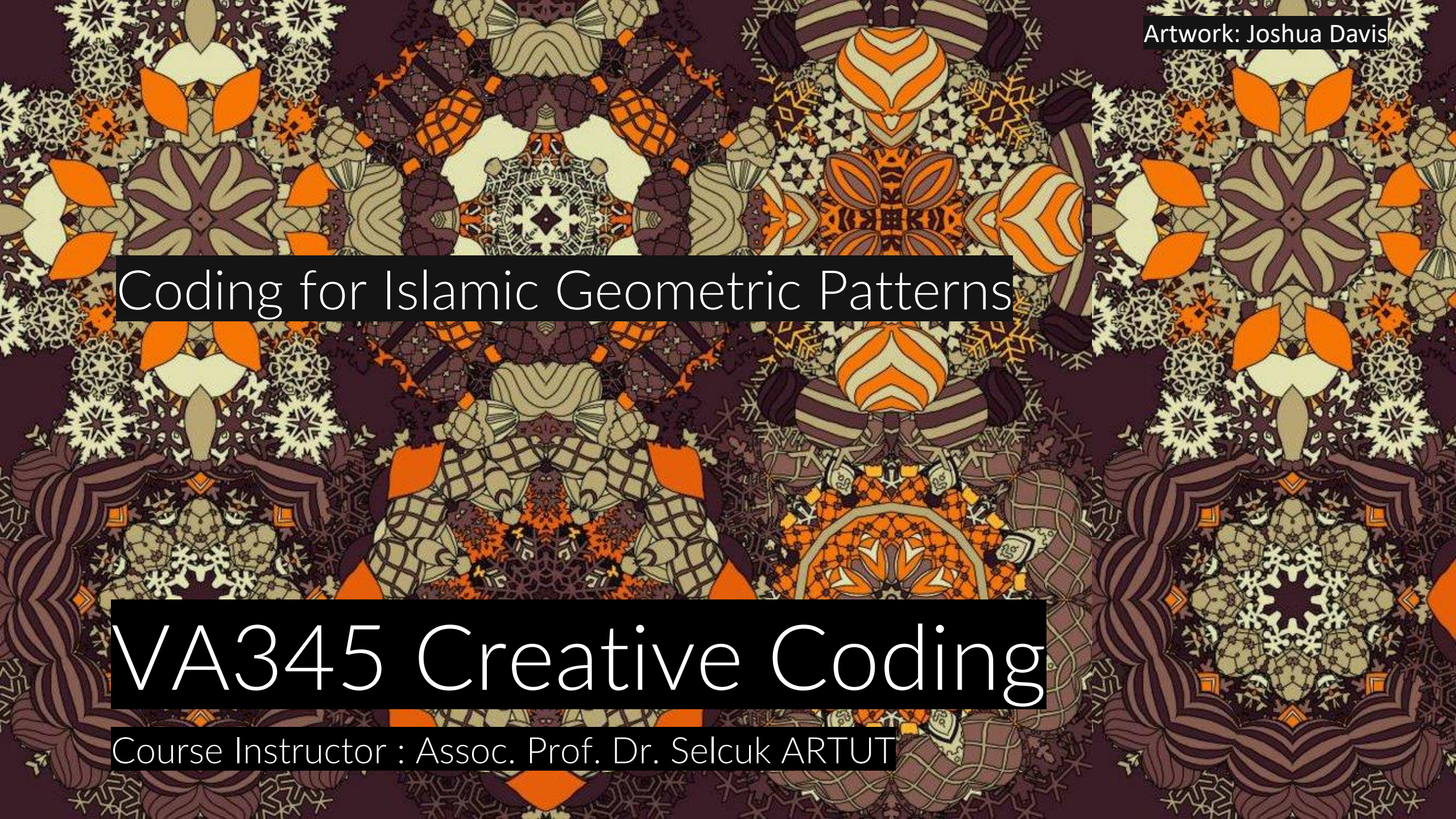


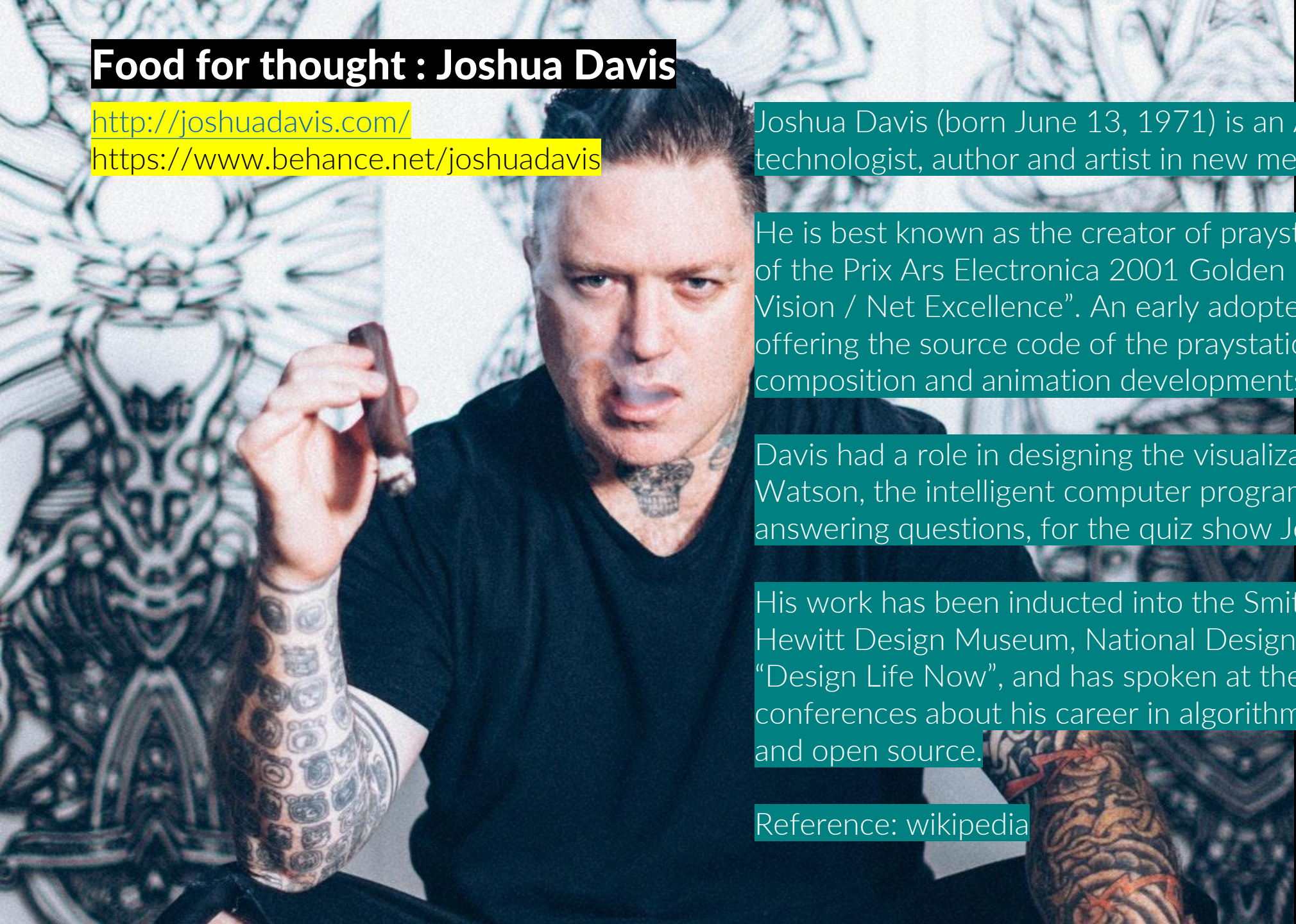
Coding for Islamic Geometric Patterns

VA345 Creative Coding

Course Instructor : Assoc. Prof. Dr. Selcuk ARTUT

Food for thought : Joshua Davis

http://joshuadavis.com/
https://www.behance.net/joshuadavis



Joshua Davis (born June 13, 1971) is an American designer, technologist, author and artist in new media.

He is best known as the creator of praystation.com, winner of the Prix Ars Electronica 2001 Golden Nica for "Net Vision / Net Excellence". An early adopter of open-source, offering the source code of the praystation.com composition and animation developments to the public.

Davis had a role in designing the visualization of IBM's Watson, the intelligent computer program capable of answering questions, for the quiz show Jeopardy.

His work has been inducted into the Smithsonian's Cooper Hewitt Design Museum, National Design Triennial 2006 "Design Life Now", and has spoken at the TED and 99U conferences about his career in algorithmic image making and open source.

Reference: wikipedia

10 2.3389351

11 4.1481485

12 0.32485694

24 3.497284

48 1.1356344

96 0.8962059

102 4.8109922

384 2.162479


Joshua Davis
joshuadavis.com
twitter.com / joshuadavis
W3Conf

Color Picking

Joshua Davis Trickv https://design-nation.icons8.com/how-to-build-a-color-palette-from-any-photo-2fdcd53082ee

- Save Image with *GIF 32 No Dither* to Reduce color complexity
- Use Color Picking Tool

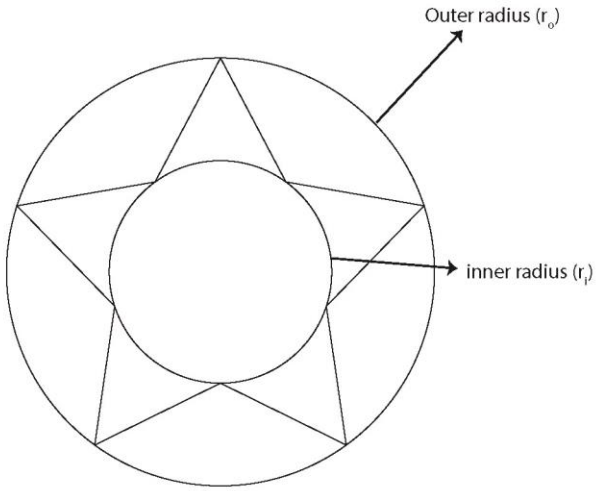
Grades so far

https://docs.google.com/spreadsheets/d/19YWae-DGa5V8WsRxDKYIkrW7gpImD9M5aT0jTHR7v-Q/edit#gid=0

Assignment 005 Visit

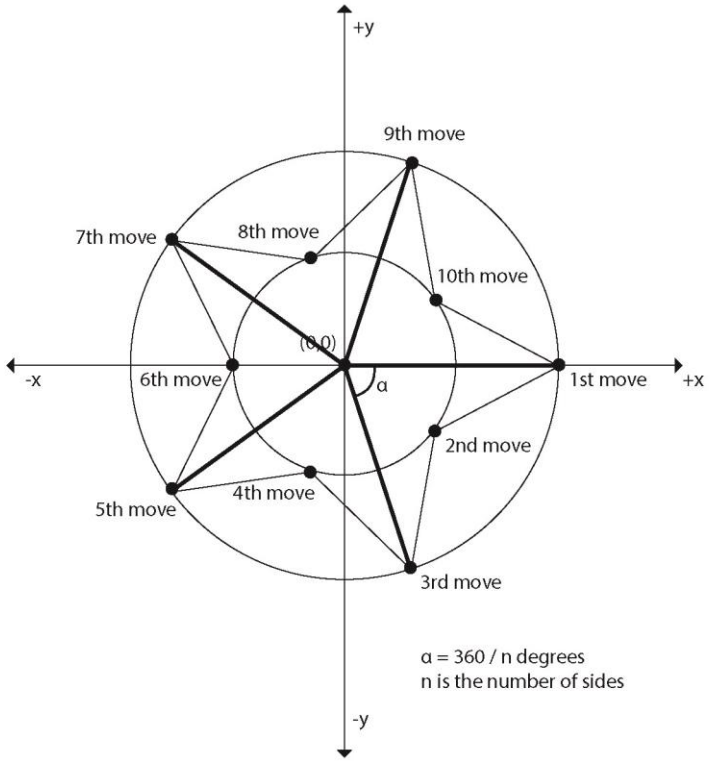
Coding an Islamic Geometric Pattern / Cappella Palatina

Every star has an inner radius and and outer radius.



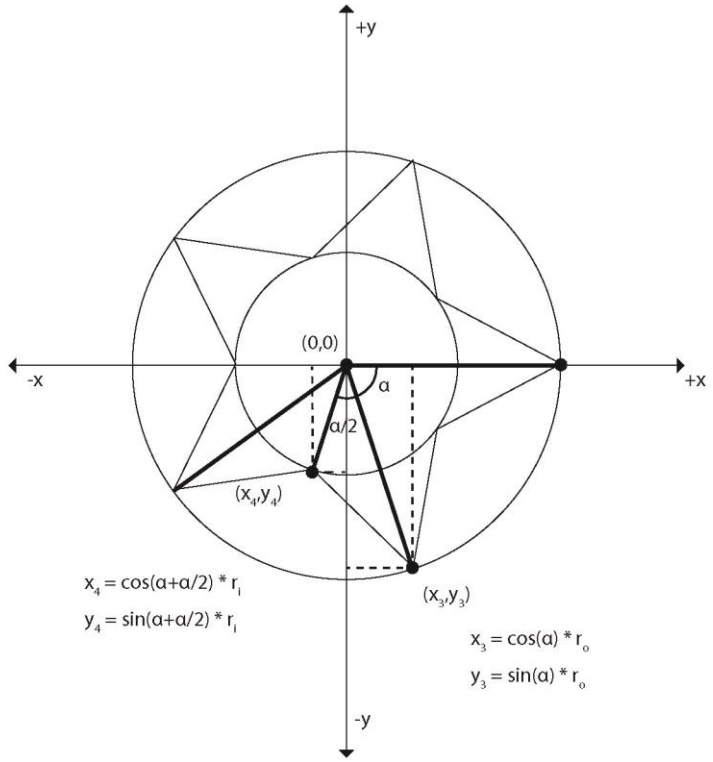
Coding an Islamic Geometric Pattern / Cappella Palatina

We are observing a two step repetitive angular movement referenced from a center.



Coding an Islamic Geometric Pattern / Cappella Palatina

Lets for the moment skip the first two step movement and concentrate the second two step movement for simplexity.



Coding an Islamic Geometric Pattern / Cappella Palatina

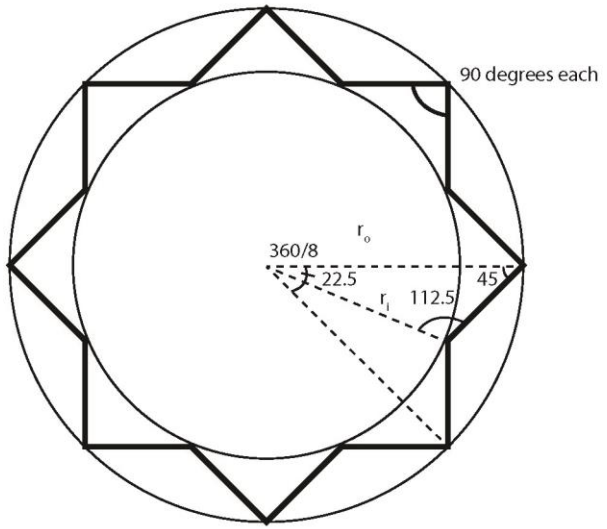
The loop can be based on this algorithm. Note we are using Radians in here.

```
let angle = TWO_PI / npoints;
let halfAngle = angle / 2.0;

for (let a = 0; a < TWO_PI; a += angle) {
   let sx = x + cos(a) * radius2;
   let sy = y + sin(a) * radius2;
   vertex(sx, sy);
   sx = x + cos(a + halfAngle) * radius1;
   sy = y + sin(a + halfAngle) * radius1;
   vertex(sx, sy);
}
```

Coding an Islamic Geometric Pattern / Cappella Palatina

For this particular star shape, we need to find a relation between the outer and the inner circle. Applying basic trigonometry, we may find a correlation between the outer (r_o) and inner radius (r_i)



$$\frac{r_i}{\sin 45°} = \frac{r_o}{\sin 112.5°}$$

Coding an Islamic Geometric Pattern / Cappella Palatina

Let's assemble this relation into our ccode

```
let outerRadius = 180;
let innerRadius;

function setup() {
  innerRadius = outerRadius * (sin(radians(45)) / sin(radians(112.5)));
  createCanvas(400, 400);
}

function draw() {
  background(102);
  push();
  translate(width * 0.5, height * 0.5);
  noFill();
  starPattern(0, 0, innerRadius, outerRadius, 8);
  pop();
}

function starPattern(x, y, radius1, radius2, npoints) {
  stroke(0, 0, 0);
  let angle = TWO_PI / npoints;
  let halfAngle = angle / 2.0;
  beginShape();
  for (let a = 0; a < TWO_PI; a += angle) {
    let sx = x + cos(a) * radius2;
    let sy = y + sin(a) * radius2;
    vertex(sx, sy);
    sx = x + cos(a + halfAngle) * radius1;
    sy = y + sin(a + halfAngle) * radius1;
    vertex(sx, sy);
  }
  endShape(CLOSE);
}
```

Coding an Islamic Geometric Pattern / Cappella Palatina

Here is the Tile Class

```
// Tile class
class Tile {
 constructor(r) {
  this.x = 0;
  this.y = 0;
  this.radius1;
  this.radius2 = r;
  this.npoints = 8;
  this.radius1 = this.radius2 * (sin(radians(45)) / sin(radians(112.5)));
 }

 display() {

  push();
  let angle = TWO_PI / this.npoints;
  let halfAngle = angle / 2.0;
  beginShape();
  for (let a = 0; a < TWO_PI; a += angle) {
   let sx = this.x + cos(a) * this.radius2;
   let sy = this.y + sin(a) * this.radius2;
   vertex(sx, sy);
   sx = this.x + cos(a + halfAngle) * this.radius1;
   sy = this.y + sin(a + halfAngle) * this.radius1;
   vertex(sx, sy);
  }
  endShape(CLOSE);
  pop();
 }
}
```


VA345 Creative Coding
Instructor: Selcuk ARTUT

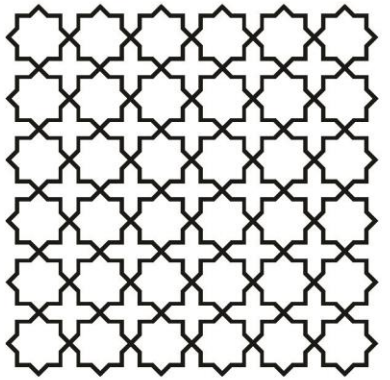
Coding an Islamic Geometric Pattern / Cappella Palatina

Here is the Tesselation

```
let tiles = []; // Declare array
let nRow;
let nCol;
let radius = 16;

function setup() {
 createCanvas(832, 832);
 nRow = floor(height / (2*radius));
 nCol = floor(width / (2*radius));
 for (let i = 0; i < nRow * nCol; i++) {
  tiles.push(new Tile(32));
 }
}

function draw() {
 background(255);
 noFill();
 stroke(0);
 push();
 translate(2*radius,2*radius);
 for (let r = 0; r < nRow; r++) {
  for (let c = 0; c < nCol; c++) {
   push();
   translate(4*radius * c, 4*radius * r);
   tiles[r + c * nRow].display();
   pop();
  }
 }
 pop();
}
```



Sabancı Üniversitesi VACD 7

Guest Lecturer: Next Week
Phillippe Pasquier

I am a professor in the School of Interactive Arts and Technology of Simon Fraser University's Faculty of Communication, Arts and Technology since January 2008. There, I am conducting both a scientific and artistic research agenda. My research focuses on the theory and practice of Artificial Intelligence, i.e., endowing machines with autonomous behaviours, with a focus on creative and artistic applications. At the Metacreation Lab for Creative AI, we are conducting work and research in three directions which I believe to be in synergy.

Google Scholar

Philippe Pasquier

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School of Interactive Arts and Technology - Simon Fraser University
Verified email at sfu.ca - Homepage

Artificial Intelligence Computational Creativity Computer Music Machine Learning
Sound and Music Computing

TITLE	CITED BY	YEAR
The 2010 Mario AI championship: Level generation track N Shaker, J Togelius, GN Yannakakis, B Weber, T Shimizu, T Hashiyama, ... IEEE Transactions on Computational Intelligence and AI in Games 3 (4), 332-347	170	2011
Towards a generic framework for automated video game level creation N Sorenson, P Pasquier European conference on the applications of evolutionary computation, 131-140	142	2010
A generic approach to challenge modeling for the procedural creation of video game levels N Sorenson, P Pasquier, S DiPaola IEEE Transactions on Computational Intelligence and AI in Games 3 (3), 229-244	91	2011
Synesketch: An open source library for sentence-based emotion recognition U Krcadinac, P Pasquier, J Jovanovic, V Devedzic IEEE Transactions on Affective Computing 4 (3), 312-325	76	2013
Realtime generation of harmonic progressions using controlled Markov selection A Eigenfeldt, P Pasquier Proceedings of ICCC-X-Computational Creativity Conference, 16-25	72	2010
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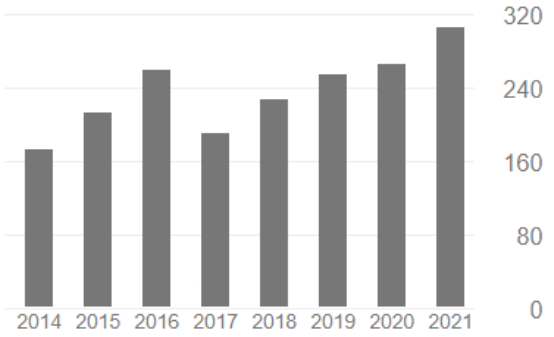

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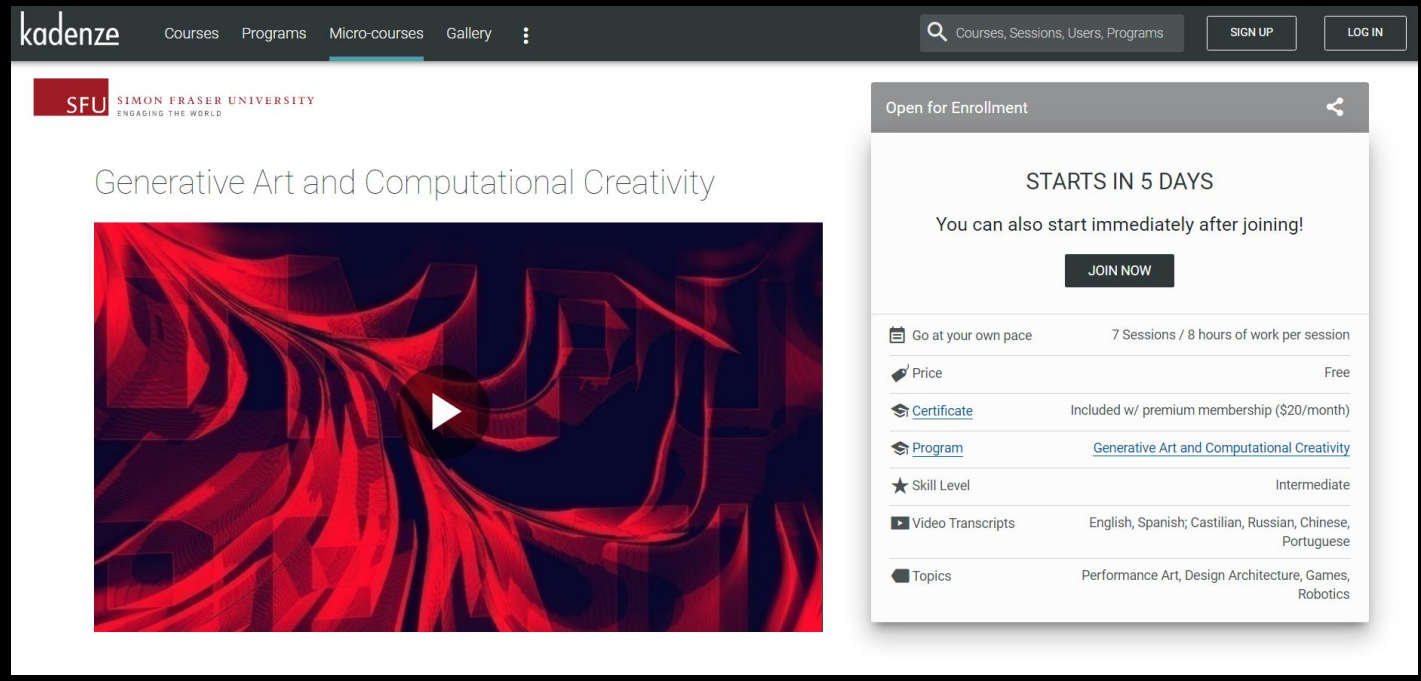
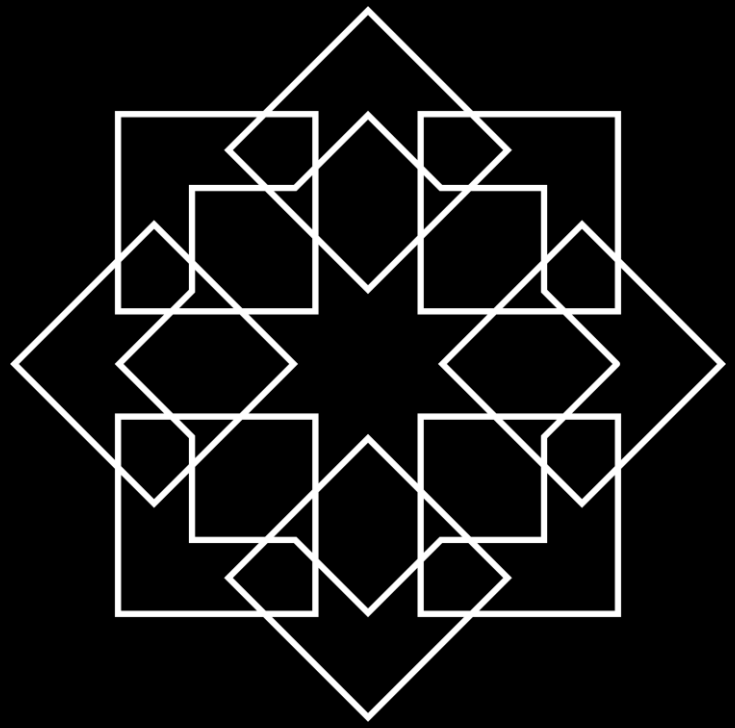
23 articles available

On Kadenze
Phillippe Pasquier



https://www.kadenze.com/courses/generative-art-and-computational-creativity-i/info

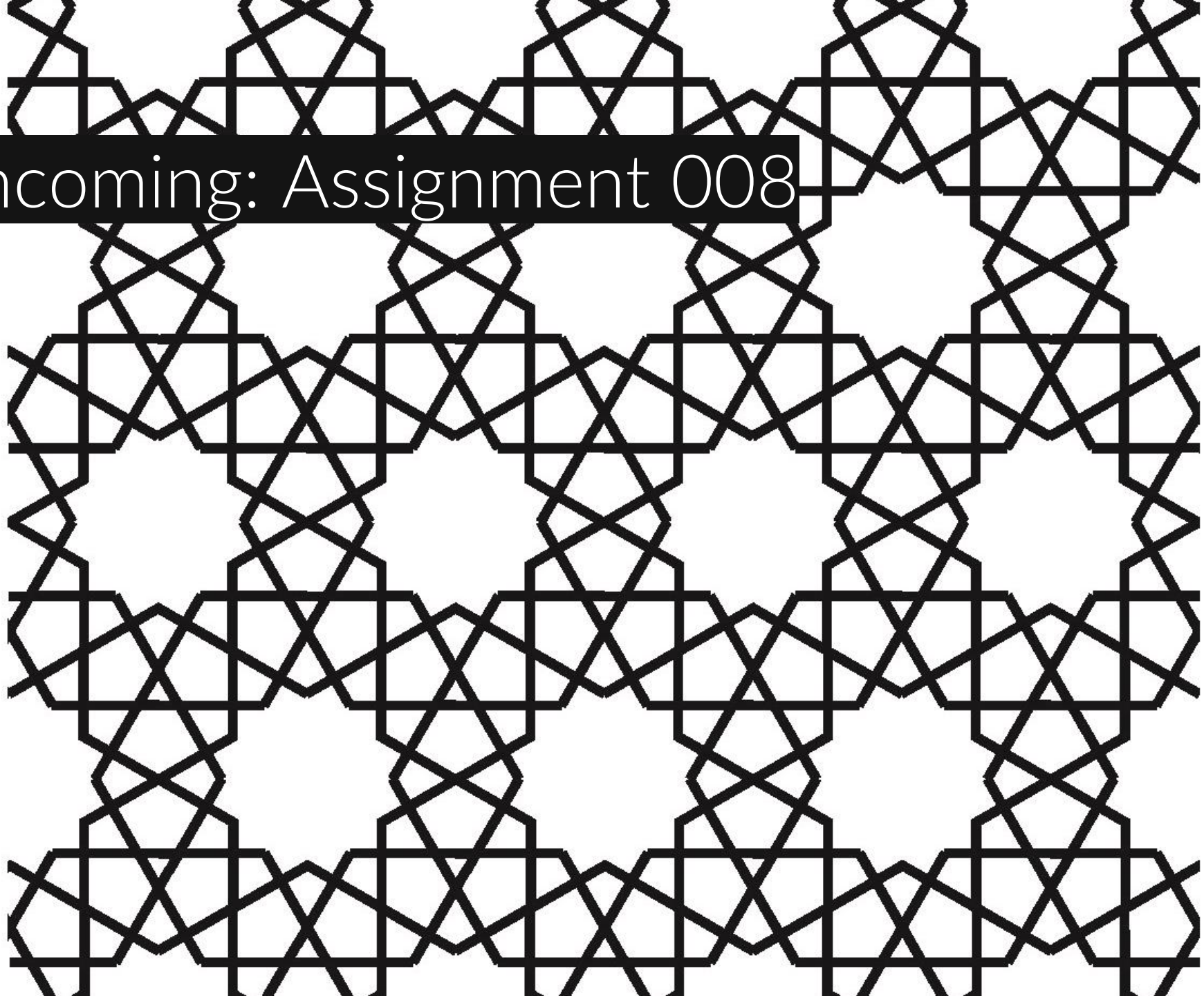


Assignment 007

Code an Islamic Geometric Pattern / Shalla Tombs, Morocco

Handdraw, Vector draw (illustrator), Code

Forthcoming: Assignment 008



Exhibition Project

Islamic Geometric Patterns

Islamic geometric patterns are one of the major forms of Islamic ornament, which tends to avoid using figurative images, as it is forbidden to create a representation of an important Islamic figure according to many holy scriptures.

The geometric designs in Islamic art are often built on combinations of repeated squares and circles, which may be overlapped and interlaced, as can arabesques (with which they are often combined), to form intricate and complex patterns, including a wide variety of tessellations. These may constitute the entire decoration, may form a framework for floral or calligraphic embellishments, or may retreat into the background around other motifs. The complexity and variety of patterns used evolved from simple stars and lozenges in the ninth century, through a variety of 6- to 13-point patterns by the 13th century, and finally to include also 14- and 16-point stars in the sixteenth century.

Ref: https://en.wikipedia.org/wiki/Islamic_geometric_patterns